AD-A152 270 ESP (EXTERNAL-STORES PROGRAM) - A PILOT COMPUTER PROGRAM FOR DETERMINING..(U) GRUMMAN AEROSPACE CORP BETHPAGE NY J B SMEDFJELD FEB 85 ADCR-85-1-VOL-3-PT-1 1/8

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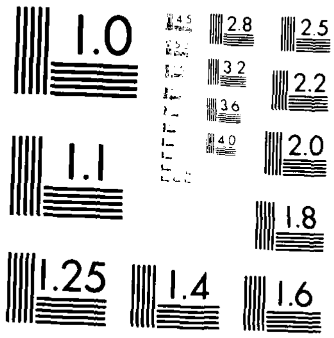

MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS 1963 A

REPORT NO. ADCR-85-1
Volume III, Part 1 of 2

ESP — A PILOT COMPUTER PROGRAM FOR DETERMINING FLUTTER-CRITICAL EXTERNAL-STORE CONFIGURATIONS

VOLUME III — PROGRAM COMPILATION PART 1 OF 2

February 1985

Prepared Under Contracts N00019-81-C-0395
and N00019-84-C-0123

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DEPARTMENT OF THE NAVY
AIR SYSTEMS COMMAND

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by

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for

NAVAL AIR SYSTEMS COMMAND
Washington, D.C. 20361

FOREWORD

This report was prepared for the Naval Air Systems Command, Washington, D.C., under contracts N00019-81-C-0395 and N00019-84-C-0123, "Computer Code for Flutter-Critical External-Store Configurations". Funding was provided via Dr. Daniel Mulville, AIR-310B. The contract technical monitor was Mr. George Maggos, AIR-5302C.

The report consists of three volumes. Volume I, entitled "User's Manual", provides instructions for using the ESP program and presents descriptions of typical output. Volume II, "Final Report on Program Enhancement and Delivery", describes the work that was performed under the two contracts. A listing from a CDC compilation of the program is contained in Volume III, "Program Compilation".

The contributions of many individuals to the successful completion of the contracts are gratefully acknowledged. Ms. Ann Marie Novak performed much of the work required to convert the original IBM code to a CDC version. Highly valuable consulting support was provided by Mr. Richard Chipman, the primary developer of the original ESP version, and by Mr. Dino George and Dr. Joel Markowitz, key developers of FASTOP. Assistance on computing problems was provided by several persons at Grumman, including (in alphabetical order) Mr. Charles Bores, Mrs. Linda Ehlinger, Mr. Joel Halpert, Mr. Luke Kraner, Mr. Donald MacKenzie, Mr. Mario Mistretta, Mr. John Ortgiesen, Ms. Florence Wimpfheimer, and Mrs. Noreen Wolt. Key contributions to making the ESP program operational on the NADC Central Computing System were made by Messrs. Robert Richey and Howard Ireland of the Naval Air Development Center. Finally, Mr. Louis Mitchell of the Naval Air Systems Command provided valuable insight into program features which would be important to practicing flutter analysts, and also provided helpful suggestions during the preparation of this report.

CONTENTS

1 - SUMMARY

A pilot computer program for determining flutter-critical external-store configurations has been developed and made operational on the Naval Air Development Center Central Computer System. The new program, designated ESP (External-Stores Program), is a derivative of the previously developed Flutter And STrength Optimization Program (FASTOP).

A compilation of the 264 subroutines in ESP is contained herein. The program consists of three major modules: (1) a vibration-analysis module, which begins with subroutine AVAM; (2) a flutter-analysis module, which begins with subroutine AFAM; and (3) a search module (called the flutter-optimization module in FASTOP), which begins with subroutine AFOM. These modules are entered via subroutine FOP, which performs most of the functions of a main program in the FASTOP and ESP Flutter Optimization Package. The actual MAIN program, which calls the FOP subroutine, is designated FASTOP herein.

To facilitate locating the compile for a particular routine, two numbered lists of all subroutine names have been provided. The first list, which is in order of appearance in the compile, determines the subroutine numbers. The second list is alphabetical. Part 1 of this volume contains the first 119 subroutines, and Part 2 contains the remainder.

Supplied keywords included: computer programs, Fortran,

2 - INTRODUCTION

During the development of the initial version of the Flutter And STrength Optimization Program (FASTOP), Reference 1, under contract F33615-72-C-1101 from the Air Force Flight Dynamics Laboratory, Mr. Keith Wilkinson, the project engineer on that contract, recognized that much of the technology being used for minimum-weight structural resizing in FASTOP also had the potential for substantially reducing the time and cost required to determine which combinations of wing-mounted external stores would result in the lowest aircraft flutter speeds.

Subsequently, under contract N00019-76-C-0160 from the Naval Air Systems Command, as well as a complementary Grumman Independent Research and Development project, a search algorithm for wing/store flutter was developed, refined, and tested by modifying and expanding the FASTOP code (see References 2 and 3). When this development effort led to a pilot program that exhibited both good reliability (absence of search failure) and good convergence characteristics, work was continued under a second NASC contract, N00019-79-C-0062, to add features desirable for practical applications and to demonstrate the new External-Stores Program (ESP) on a representative attack aircraft and its associated store inventory (see Reference 4). The project engineer on these studies was Mr. Richard Chipman.

With the performance and the advantages of the store search procedure having been confirmed, early utilization of the procedure on current aircraft projects became desirable. Toward this end, the program was further enhanced as described in Volume II of this report, and a user's manual, Volume I, was written. Also, the program was made operational on the Central Computer System at the Naval Air Development Center. A compilation of this latest version of the program is contained in this volume, Volume III.

3 - LIST OF SUBROUTINES NAMES IN ORDER OF APPEARANCE IN COMPILE

1 - FASTOP	2 - TFASTO	3 - FOP	4 - TFOP
5 - LDB	6 - ENDP	7 - DTABLE	8 - SETUP
9 - LTABLE	10 - LLABEL	11 - FSIOFO	12 - DSIOFO
13 - PTABLE	14 - PLABEL	15 - GEDLAB	16 - PUDLAB
17 - FSIO	18 - DSIO	19 - TSIO	20 - FCLOSE
21 - MESAGE	22 - TIMEB	23 - PROGNA	24 - PRMAT1
25 - PRMAT2	26 - SCAPRO	27 - DSQRTF	28 - DCMPLF
29 - CDABSF	30 - RDM	31 - AVAM	32 - TAVAM
33 - READY	34 - DYNMAS	35 - MASTOR	36 - FPMASS
37 - IV33	38 - BSOLVE	39 - MSG02	40 - QFACT
41 - QCHOL	42 - HOTDOT	43 - TRAN	44 - QFSOL
45 - QFOR	46 - QPASS	47 - REVERS	48 - QBSOL
49 - QBAC	50 - UNFIL	51 - MULT	52 - ENMMPY
53 - VIBIFO	54 - COMPAK	55 - EIGEN	56 - READMA
57 - RITVEC	58 - SYMEIG	59 - TFORM	60 - STURM
61 - PREP	62 - QSVEC	63 - SWAP	64 - DOTPRO
65 - ANDOR	66 - TRIEQ	67 - FUTILE	68 - DAGGER
69 - VIBRAP	70 - MMULT	71 - MCMULT	72 - ARAYMX
73 - ARAYMN	74 - MAX	75 - CLCORD	76 - FERGCV
77 - AFAM	78 - TAFAM	79 - RNRW	80 - CNRW
81 - DSCAPR	82 - COMSCA	83 - POOL	84 - FLINFO
85 - MOVIS	86 - HELGX	87 - FORM	88 - HELGA
89 - PICTUR	90 - AORDER	91 - SCLMAX	92 - ROUND
93 - SCLINC	94 - FATAN	95 - RODDEN	96 - PART1
97 - ATAN3	98 - MIDI	99 - MODAL	100 - HELP
101 - BIDI	102 - BEIN	103 - SPLIT3	104 - TRIDI
105 - MERGE	106 - GLOBAL	107 - GENQ	108 - AUGW
109 - TKER	110 - PRT2	111 - INCRO	112 - KERNEL
113 - IDF1	114 - IDF2	115 - SNPDF	116 - QUAS
117 - FUTSOL	118 - GENF	119 - MACH	120 - EVOVLE
121 - TANL	122 - TANT	123 - NOXN	124 - PLAN
125 - HELZ	126 - MODAZ	127 - ORDS	128 - DSPMD
129 - COFFIN	130 - NORDER	131 - RIP	132 - TRIP
133 - DSPDDW	134 - IMAGE	135 - KERN	136 - GEOM

137 - WHSA	138 - XTEXLE	139 - INTP	140 - FORK
141 - INVK	142 - CONB	143 - QUADX	144 - QUAXA
145 - QUAYB	146 - CONA	147 - SPCLA	148 - PARAM1
149 - GRS	150 - CLSQ	151 - UNIFAC	152 - DUPER
153 - SUPERF	154 - UNISLV	155 - PRESS	156 - SOLFLT
157 - QFLIN	158 - FLOP	159 - ZANLYN	160 - F
161 - CDET	162 - VERTST	163 - RTIN	164 - ASSESS
165 - FRORD	166 - VECP	167 - GENEIG	168 - JORCOM
169 - ORIENT	170 - ADIV	171 - CDAT	172 - CLUSAL
173 - GCVEC	174 - GRVEC	175 - CLUTSL	176 - EIGM
177 - CONV	178 - SREVNC	179 - FLSL	180 - BUCK
181 - FLASH	182 - VALCOM	183 - CQR	184 - VALROM
185 - CLR	186 - COMVEC	187 - GGCHK	188 - CLINEQ
189 - TRFR	190 - PRPLT	191 - FLUTAP	192 - VGPT
193 - AXPL	194 - AXIS	195 - TIPL	196 - AFOM
197 - TAFOM	198 - DRVTV	199 - DRVSTR	200 - FLTDES
201 - PACK	202 - UNPACK	203 - PUTROW	204 - GETROW
205 - CLUES	206 - PLB	207 - WORDS	208 - ERROR
209 - DVALUE	210 - IVALUE	211 - EOF01	212 - RWBT
213 - TITLES	214 - TIMEA	215 - PROGN	216 - HEAD
217 - DOPEN	218 - FETS	219 - DWRITE	220 - DREAD
221 - DFIND	222 - DCLOSE	223 - UCHECK	224 - MYIO
225 - MMOVE	226 - DVOLNO	227 - ABDUMP	228 - STRDES
229 - RILL	230 - VSCALE	231 - MURT	232 - USTEP
233 - CONSTR	234 - LINESR	235 - SOSCAP	236 - INCONS
237 - SERS	238 - MERS	239 - RECONS	240 - SETJGL
241 - LMKP1	242 - ADDCON	243 - LAGMUL	244 - HYPER
245 - LDFIX	246 - DELCON	247 - GRAPRO	248 - INSECT
249 - INV	250 - SOQUAS	251 - SOFUT	252 - TRPOSE
253 - DYNSTF	254 - TRIXY	255 - UPDATE	256 - CHANGE
257 - MOVE	258 - WDCHAR	259 - REDMOD	260 - REDVEC
261 - NRM2	262 - SREVNI	263 - QINTF	264 - NASTRD

4 - ALPHABETICAL LIST OF SUBROUTINE NAMES

5 - COMPILE LISTING

A listing from a compile of all ESP subroutines on the Central Computer System at the Naval Air Development Center begins on the following page.

```
C                                                                          FASTOP   2
CCDC  BEGINNING OF STATEMENTS ASSOCIATED WITH CDC COMPUTER PROGRAMS        FASTOP   3
      PROGRAM MAIN(INPUT,OUTPUT,TAPE16,TAPE6=OUTPUT,TAPE5=INPUT,           FASTOP   4
     1              TAPE17=512,TAPE18=512,TAPE19=512,TAPE20=512,           FASTOP   5
     2              TAPE21=512,TAPE22=512,TAPE23=512,TAPE24=512,           FASTOP   6
     3              TAPE25=512,TAPE26=512,TAPE27=512,TAPE28=512,           FASTOP   7
     4              TAPE29=512,TAPE30=512,TAPE31=512,TAPE32=512,           FASTOP   8
     5              TAPE33=512,TAPE34=512,TAPE35=512,TAPE36=512,           FASTOP   9
     6              TAPE37=512,TAPE39=512,TAPE40=512,TAPE41=512,           FASTOP  10
     7              TAPE42=512,TAPE43=512,TAPE44=512,TAPE45=512,           FASTOP  11
     8              TAPE47=512,TAPE48=512,TAPE49=512,TAPE50=512,           FASTOP  12
     9              TAPE57=512,TAPE58=512,TAPE59=512,TAPE60=512)           FASTOP  13
CCDC  ENDING OF STATEMENTS ASSOCIATED WITH CDC COMPUTER PROGRAMS           FASTOP  14
C                                                                          FASTOP  15
C45700. PROG  FASTOP (FLUTTER AND STRUCTURAL OPTIMIZATION PROGRAM)         FASTOP  16
C                                                                          FASTOP  17
C     PROGRAM FASTOP                                                       FASTOP  18
C                                                                          FASTOP  19
C************************************************************************* FASTOP  20
C************************************************************************* FASTOP  21
C************************************************************************* FASTOP  22
C************************************************************************* FASTOP  23
C************************************************************************* FASTOP  24
C*****                                                              ****** FASTOP  25
C*****        FFFFF    AAA     SSSS   TTTTT    OOO     PPPP         ****** FASTOP  26
C*****        F       A   A   S         T     O   O    P   P        ****** FASTOP  27
C*****        FFFF  - AAAAA -  SSS  -   T   - O   O -  PPPP         ****** FASTOP  28
C*****        F       A   A       S     T     O   O    P            ****** FASTOP  29
C*****        F       A   A   SSSS      T      OOO     P            ****** FASTOP  30
C*****                                                              ****** FASTOP  31
C************************************************************************* FASTOP  32
C************************************************************************* FASTOP  33
C************************************************************************* FASTOP  34
C************************************************************************* FASTOP  35
C******************************** **************************************** FASTOP  36
C                                                                        * FASTOP  37
      INTEGER YES                                                          FASTOP  38
      DIMENSION AFFDL(4)                                                   FASTOP  39
      DIMENSION DATE(4)                                                    FASTOP  40
      DIMENSION FMTAO(3)                                                   FASTOP  41
      DIMENSION TMH(18,2)        ,TMAIN(2)                                 FASTOP  42
      DIMENSION TFH(18)                                                    FASTOP  43
C                                                                          FASTOP  44
      COMMON /COMRWP/ ITAPER,ITAPEW,ITAPEP                                 FASTOP  45
      COMMON /CTMH  / KTMH  ,LTMH  ,TMH                                    FASTOP  46
      COMMON /MESAG / KMESAG,KTITLE,KTIME ,KTIMEL                          FASTOP  47
      COMMON /CTFH  / KTFH  ,LTFH  ,TFH                                    FASTOP  48
      COMMON /CONSTS/ NO    ,YES                                           FASTOP  49
      COMMON /CLIST / KOUNT ,KPAGE ,LINES ,LINEST,KLABEL,KTPAGE,NPAGE      FASTOP  50
     1               ,KBPAGE,LINESG,KOUNTH,KOUNTI                          FASTOP  51
      COMMON /CTABLE/ KTABLE,NPASS ,NROWS ,NCOLS ,NCOLST,KTABLO,NPAGEA     FASTOP  52
     1               ,ITAPET                                               FASTOP  53
      COMMON /REPORT/ KREPOR                                               FASTOP  54
      COMMON /CFMTAO/ FMTAO                                                FASTOP  55
      COMMON /COMPUT/ KOMPUT,NCHARW                                        FASTOP  56
      COMMON /LABELS/ KFLABO,KDLABO,KFLABI,KDLABI,ITAPEL,KLABEI            FASTOP  57
      COMMON /CAFFDL/ AFFDL                                                FASTOP  58
```

```
           * 37x                                                     TFASTO    401
           P 13H PPP                                                 TFASTO    402
           * 3X,  1H*                                                TFASTO    403
           *,/,  5x 1H* 2x                                           TFASTO    404
           *,5X,   15H                       ,4x                     TFASTO    405
           *,             40H  GGGGGG                      ,1X       TFASTO    406
           *,37x                                                     TFASTO    407
           P,13H PPP                                                 TFASTO    408
           *,3X   1H*)                                               TFASTO    409
       210 FORMAT (                                                  TFASTO    410
           *      5X,1H*,2X                                          TFASTO    411
           *,24X,         40H  GGGG                        ,1X       TFASTO    412
           * 37x                                                     TFASTO    413
           P 13H PPP                                                 TFASTO    414
           *,3X,  1H*                                                TFASTO    415
           *,/,  5X,1H*,2X                                           TFASTO    416
           *,24X,         40H  GG                          ,1X       TFASTO    417
           *,37X                                                     TFASTO    418
           P,13HPPPP                                                 TFASTO    419
           *,3X,  1H*                                                TFASTO    420
           *,/,  5X,1H*,2X                                           TFASTO    421
           *,24X,         40H  G                           ,1X       TFASTO    422
           *,37X                                                     TFASTO    423
           P,13HPPPP                                                 TFASTO    424
           *,3X,  1H*)                                               TFASTO    425
       215 FORMAT (5X,1H*,120X,1H*,/, 5X,122(1H*))                   TFASTO    426
     C                                                               TFASTO    427
             RETURN                                                  TFASTO    428
           END                                                       TFASTO    429
```

```
      SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS      DEF LINE     REFERENCES
    1  TFASTO         14         427

VARIABLES      SN  TYPE           RELOCATION
    0  AFFDL       REAL      ARRAY    CAFFDL      REFS       16        23        57
    2  ITAPEP      INTEGER            COMRWP      REFS       18
    0  ITAPER      INTEGER            COMRWP      REFS       18
    7  ITAPET      INTEGER            CTABLE      REFS       21
    1  ITAPEW      INTEGER            COMRWP      REFS       18   I/O REFS       53        54        55        56        57
                                                    58       59        60        61        62        63        64        65
                                                    66       67        68        69        70        71        72        73
                                                    74       75        76
    7  KBPAGE      INTEGER            CLIST       REFS       19
    4  KLABEL      INTEGER            CLIST       REFS       19
    0  KOUNT       INTEGER            CLIST       REFS       19   DEFINED        28        48
   11  KOUNTH      INTEGER            CLIST       REFS       19
    1  KPAGE       INTEGER            CLIST       REFS       19
    0  KTABLE      INTEGER            CTABLE      REFS       21   DEFINED        32        36        39        42        45
    5  KTABLO      INTEGER            CTABLE      REFS       21
    5  KTPAGE      INTEGER            CLIST       REFS       19
    2  LINES       INTEGER            CLIST       REFS       19        28        48
```

```
     *,24X,        40H  GGGGGGGGGGGGGGGGGGGGGGGGGGGG          ,1X          TFASTO   344
     *,17X                                                                 TFASTO   345
     0,13H000         000                                                  TFASTO   346
     *,7X                                                                  TFASTO   347
     P,13H PPP     PPP                                                     TFASTO   348
     *,3X,  1H*                                                            TFASTO   349
     *,/,  5X,1H*,2X                                                       TFASTO   350
     *,24X,        40H   GGGGGGGGGGGGGGGGGGGGG                ,1X          TFASTO   351
     *,17X                                                                 TFASTO   352
     0,13H000         000                                                  TFASTO   353
     *,7X                                                                  TFASTO   354
     P,13H PPPPPPPPP                                                       TFASTO   355
     *,3X,  1H*)                                                           TFASTO   356
 195 FORMAT (                                                              TFASTO   357
     *     5X,1H*,2X                                                       TFASTO   358
     *,5X,   15H.  ...........,4X                                          TFASTO   359
     *,            40H    GGGGGGGGGGGGGGGG                    ,1X          TFASTO   360
     *,17X                                                                 TFASTO   361
     0,13H000         000                                                  TFASTO   362
     *,7X                                                                  TFASTO   363
     P,13H PPPPPPPP                                                        TFASTO   364
     *,3X,  1H*                                                            TFASTO   365
     *,/,  5X,1H*,2X                                                       TFASTO   366
     *,5X,   15H.              ,4X                                         TFASTO   367
     *,            40H   GGGGGGGGGGGGGGG                      ,1X          TFASTO   368
     *,17X                                                                 TFASTO   369
     0,13H 0000    0000                                                    TFASTO   370
     *,7X                                                                  TFASTO   371
     P,13H PPP                                                             TFASTO   372
     *,3X,  1H*)                                                           TFASTO   373
 200 FORMAT (                                                              TFASTO   374
     *     5X,1H*,2X                                                       TFASTO   375
     *,5X,   15H.   GRUMMAN    .,4X                                        TFASTO   376
     *,            40H  GGGGGGGGGGGGGG                        ,1X          TFASTO   377
     *,17X                                                                 TFASTO   378
     0,13H  000000000                                                      TFASTO   379
     *,7X                                                                  TFASTO   380
     P,13H PPP                                                             TFASTO   381
     *,3X,  1H*                                                            TFASTO   382
     *,/,  5X,1H*,2X                                                       TFASTO   383
     *,5X,   15H.  AEROSPACE  .,4X                                         TFASTO   384
     *,            40H  GGGGGGGGGGGG                          ,1X          TFASTO   385
     *,17X                                                                 TFASTO   386
     0,13H   0000000                                                       TFASTO   387
     *,7X                                                                  TFASTO   388
     P,13H PPP                                                             TFASTO   389
     *,3X,  1H*)                                                           TFASTO   390
 205 FORMAT (                                                              TFASTO   391
     *     5X,1H*,2X                                                       TFASTO   392
     *,5X,   15H. CORPORATION  ,4X                                         TFASTO   393
     *,            40H  GGGGGGGGGG                            ,1X          TFASTO   394
     *,37X                                                                 TFASTO   395
     P,13H PPP                                                             TFASTO   396
     *,3X,  1H*                                                            TFASTO   397
     *,/,  5X,1H*,2X                                                       TFASTO   398
     *,5X,   15H.             .,4X                                         TFASTO   399
```

```
     S,13H   SSSSSSS
     *,7X
     T,13H     TTT
     *,7X
     O,13HOOO        OOO
     *,7X
     P,13HPPPPPPPPPPPP
     *,3X, 1H*)
 175 FORMAT (
     *    5X,1H*,64X
     T,13H     TTT
     *,7X
     O,13HOOO        OOO
     *,7X
     P,13H PPP    PPPP
     *,3X, 1H*
     *,/, 5X,1H*,64X
     T,13H     TTT
     *,7X
     O,13HOOO        OOO
     *,7X
     P,13H PPP      PPP
     *, 3X,  1H*)
 180 FORMAT (
     *    5X,1H*,64X
     T,13H     TTT
     *,7X
     O,13HOOO        OOO
     *,7X
     P,13H PPP      PPP
     *,3X, 1H*
     *,/, 5X,1H*,64X
     T,13H     TTT
     *,7X
     O,13HOOO        OOO
     *,7X
     P,13H PPP      PPP
     *,3X, 1H*)
 185 FORMAT (
     *    5X,1H*,2X
     *,8(3HGGG), 38HGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGG
     T,13HGG   TTT
     *,7X
     O,13HOOO        OOO
     *,7X
     P,13H PPP      PPP
     *,3X, 1H*
     *,/, 5X,1H*,2X
     *,8(3HGGG), 38HGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGG
     T,13H     TTT
     *,7X
     O,13HOOO        OOO
     *,7X
     P,13H PPP     PPP
     *,3X, 1H*)
 190 FORMAT (
     *    5X,1H*,2X
```

```
     *,7X                                                         TFASTO   230
     S,13H          SSS                                           TFASTO   231
     *,7X                                                         TFASTO   232
     T,13H     TTT                                                TFASTO   233
     *,7X                                                         TFASTO   234
     O,13H   0000000                                              TFASTO   235
     *,23X,  1H*                                                  TFASTO   236
     *,/, 5X,1H*,24X                                              TFASTO   237
     A,13HAAA       AAA                                           TFASTO   238
     *,7X                                                         TFASTO   239
     S,13H  S       SSS                                           TFASTO   240
     *,7X                                                         TFASTO   241
     T,13H     TTT                                                TFASTO   242
     *,7X                                                         TFASTO   243
     O,13H  000000000                                             TFASTO   244
     *,23X,  1H*)                                                 TFASTO   245
  160 FORMAT (                                                    TFASTO   246
     *    5X,1H*,44X                                              TFASTO   247
     S,13H SS       SSS                                           TFASTO   248
     *,7X                                                         TFASTO   249
     T,13H     TTT                                                TFASTO   250
     *,7X                                                         TFASTO   251
     O,13H 0000   0000                                            TFASTO   252
     *,23X,  1H*                                                  TFASTO   253
     *,/, 5X,1H*,44X                                              TFASTO   254
     S,13HSSS       SSS                                           TFASTO   255
     *,7X                                                         TFASTO   256
     T,13H     TTT                                                TFASTO   257
     *,7X                                                         TFASTO   258
     O,13H000       000                                           TFASTO   259
     *,23X,  1H*)                                                 TFASTO   260
  165 FORMAT (                                                    TFASTO   261
     *    5X,1H*,44X                                              TFASTO   262
     S,13HSSSS     SSSS                                           TFASTO   263
     *,7X                                                         TFASTO   264
     T,13H     TTT                                                TFASTO   265
     *,7X                                                         TFASTO   266
     O,13H000       000                                           TFASTO   267
     *,23X,  1H*                                                  TFASTO   268
     *,/, 5X,1H*,44X                                              TFASTO   269
     S,13H SSSS   SSSS                                            TFASTO   270
     *,7X                                                         TFASTO   271
     T,13H     TTT                                                TFASTO   272
     *,7X                                                         TFASTO   273
     O,13H000       000                                           TFASTO   274
     *,23X,  1H*)                                                 TFASTO   275
  170 FORMAT (                                                    TFASTO   276
     *    5X,1H*,44X                                              TFASTO   277
     S,13H  SSSSSSSSS                                             TFASTO   278
     *,7X                                                         TFASTO   279
     T,13H     TTT                                                TFASTO   280
     *,7X                                                         TFASTO   281
     O,13H000       000                                           TFASTO   282
     *,7X                                                         TFASTO   283
     P,13HPPPPPPPPPPP                                             TFASTO   284
     *,3X, 1H*                                                    TFASTO   285
     *,/, 5X,1H*,44X                                              TFASTO   286
```

```
     * ,7X                                                          TFASTO    173
     A,13H  AAAA AAAA                                               TFASTO    174
     *,7X                                                           TFASTO    175
     S,13HSSS        SS                                             TFASTO    176
     *,63X,  1H*)                                                   TFASTO    177
 140 FORMAT (                                                       TFASTO    178
     *     5X,1H*,4X                                                TFASTO    179
     F,13HFFFF                                                      TFASTO    180
     *,7X                                                           TFASTO    181
     A,13H  AAA   AAA                                               TFASTO    182
     *,7X                                                           TFASTO    183
     S,13HSSS        S                                              TFASTO    184
     *,7X                                                           TFASTO    185
     T,13HTTTTTTTTTTTTT                                             TFASTO    186
     *,43X,  1H*                                                    TFASTO    187
     *,/, 5X,1H*,4X                                                 TFASTO    188
     F,13HFFFF                                                      TFASTO    189
     *,7X                                                           TFASTO    190
     A,13H  AAA   AAA                                               TFASTO    191
     *,7X                                                           TFASTO    192
     S,13HSSS                                                       TFASTO    193
     *,7X                                                           TFASTO    194
     T,13HTTTTTTTTTTTTT                                             TFASTO    195
     *,43X,  1H*)                                                   TFASTO    196
 145 FORMAT (                                                       TFASTO    197
     *     5X,1H*,24X                                               TFASTO    198
     A,13H AAA      AAA                                             TFASTO    199
     *,7X                                                           TFASTO    200
     S,13HSSSS                                                      TFASTO    201
     *,7X                                                           TFASTO    202
     T,13HTTT  TTT  TTT                                             TFASTO    203
     *,43X,  1H*                                                    TFASTO    204
     *,/, 5X,1H*,24X                                                TFASTO    205
     A,13H AAA      AAA                                             TFASTO    206
     *,7X                                                           TFASTO    207
     S,13H SSSSSSSSSS                                               TFASTO    208
     *,7X                                                           TFASTO    209
     T,13H     TTT                                                  TFASTO    210
     *,43X,  1H*)                                                   TFASTO    211
 150 FORMAT (                                                       TFASTO    212
     *     5X,1H*,24X                                               TFASTO    213
     A,13H AAA      AAA                                             TFASTO    214
     *,7X                                                           TFASTO    215
     S,13H  SSSSSSSSSS                                              TFASTO    216
     *,7X                                                           TFASTO    217
     T,13H     TTT                                                  TFASTO    218
     *,43X,  1H*                                                    TFASTO    219
     *,/, 5X,1H*,24X                                                TFASTO    220
     A,13HAAA        AAA                                            TFASTO    221
     *,7X                                                           TFASTO    222
     S,13H          SSSS                                            TFASTO    223
     *,7X                                                           TFASTO    224
     T,13H     TTT                                                  TFASTO    225
     *,43X,  1H*)                                                   TFASTO    226
 155 FORMAT (                                                       TFASTO    227
     *     5X,1H*,24X                                               TFASTO    228
     A,13HAAA        AAA                                            TFASTO    229
```

```
     *,43X, 36H.           AIR FORCE            .,4X,1H*        TFASTO   116
     *,/, 5X,1H*,4X                                              TFASTO   117
     F,13H FFFFFFFFF                                             TFASTO   118
     *,7X                                                        TFASTO   119
     A,13H    AAAAA                                              TFASTO   120
     *,43X, 36H.    FLIGHT DYNAMICS LABORATORY    .,4X,1H*)      TFASTO   121
 120 FORMAT (                                                    TFASTO   122
     *    5X,1H*,4X                                              TFASTO   123
     F,13H FFFFFFFFF                                             TFASTO   124
     *,7X                                                        TFASTO   125
     A,13H   AAA AAA                                             TFASTO   126
     *,43X, 36H.                                .,4X,1H*        TFASTO   127
     *,/, 5X,1H*,4X                                              TFASTO   128
     F,13H FFF                                                   TFASTO   129
     *,7X                                                        TFASTO   130
     A,13H   AAA AAA                                             TFASTO   131
     *,43X, 10H.         ,4A4, 10H         .4X,1H*)              TFASTO   132
 125 FORMAT (                                                    TFASTO   133
     *    5X,1H*,4X                                              TFASTO   134
     F,13H FFF                                                   TFASTO   135
     *,7X                                                        TFASTO   136
     A,13H   AAA AAA                                             TFASTO   137
     *,7X                                                        TFASTO   138
     S,13H   SSSSSSS                                             TFASTO   139
     *,23X, 36H.                                .,4X,1H*        TFASTO   140
     *,/, 5X,1H*,4X                                              TFASTO   141
     F,13H FFF                                                   TFASTO   142
     *,7X                                                        TFASTO   143
     A,13H   AAA AAA                                             TFASTO   144
     *,7X                                                        TFASTO   145
     S,13H  SSSSSSSSS                                            TFASTO   146
     *,23X, 36H.................................,4X,1H*)         TFASTO   147
 130 FORMAT (                                                    TFASTO   148
     *    5X,1H*,4X                                              TFASTO   149
     F,13H FFF                                                   TFASTO   150
     *,7X                                                        TFASTO   151
     A,13H   AAA AAA                                             TFASTO   152
     *,7X                                                        TFASTO   153
     S,13H SSSS    SSSS                                          TFASTO   154
     *,63X,   1H*                                                TFASTO   155
     *,/, 5X,1H*,4X                                              TFASTO   156
     F,13H FFF                                                   TFASTO   157
     *,7X                                                        TFASTO   158
     A,13H  AAAAAAAAA                                            TFASTO   159
     *,7X                                                        TFASTO   160
     S,13HSSSS      SSSS                                         TFASTO   161
     *,63X,   1H*)                                               TFASTO   162
 135 FORMAT (                                                    TFASTO   163
     *    5X,1H*,4X                                              TFASTO   164
     F,13H FFF                                                   TFASTO   165
     *,7X                                                        TFASTO   166
     A,13H  AAAAAAAAA                                            TFASTO   167
     *,7X                                                        TFASTO   168
     S,13HSSS         SSS                                        TFASTO   169
     *,63X,   1H*                                                TFASTO   170
     *,/, 5X,1H*,4X                                              TFASTO   171
```

```
      WRITE (ITAPEW,125)                                                TFASTO  59
      WRITE (ITAPEW,130)                                                TFASTO  60
      WRITE (ITAPEW,135)                                                TFASTO  61
      WRITE (ITAPEW,140)                                                TFASTO  62
      WRITE (ITAPEW,145)                                                TFASTO  63
      WRITE (ITAPEW,150)                                                TFASTO  64
      WRITE (ITAPEW,155)                                                TFASTO  65
      WRITE (ITAPEW,160)                                                TFASTO  66
      WRITE (ITAPEW,165)                                                TFASTO  67
      WRITE (ITAPEW,170)                                                TFASTO  68
      WRITE (ITAPEW,175)                                                TFASTO  69
      WRITE  (ITAPEW,180)                                               TFASTO  70
      WRITE  (ITAPEW,185)                                               TFASTO  71
      WRITE  (ITAPEW,190)                                               TFASTO  72
      WRITE  (ITAPEW,195)                                               TFASTO  73
      WRITE  (ITAPEW,200)                                               TFASTO  74
      WRITE  (ITAPEW,205)                                               TFASTO  75
      WRITE  (ITAPEW,210)                                               TFASTO  76
      WRITE  (ITAPEW,215)                                               TFASTO  77
  100 FORMAT (                                                          TFASTO  78
     *    5X,122(1H*)                                                   TFASTO  79
     *,/, 5X,1H*,120X,1H*                                               TFASTO  80
     *,/, 5X,1H*,4X                                                     TFASTO  81
     F,13HFFFFFFFFFFFFF                                                 TFASTO  82
     *,63X, 36H....................................,4X,1H*              TFASTO  83
     *,/, 5X,1H*,4X                                                     TFASTO  84
     F,13HFFFFFFFFFFFFF                                                 TFASTO  85
     *,63X, 36H.                                  .,4X,1H*              TFASTO  86
     *,/, 5X,1H*,4X                                                     TFASTO  87
     F,13H FFF     FFF                                                  TFASTO  88
     *,63X, 36H.          **** FASTOP ****        .,4X,1H*)             TFASTO  89
  105 FORMAT (                                                          TFASTO  90
     *    5X,1H*,4X                                                     TFASTO  91
     F,13H FFF     FFF                                                  TFASTO  92
     *,63X, 36H.      FLUTTER AND STRUCTURAL      .,4X,1H*              TFASTO  93
     *,/, 5X,1H*,4X                                                     TFASTO  94
     F,13H FFF                                                          TFASTO  95
     *,63X, 36H.       OPTIMIZATION PROGRAM       .,4X,1H*              TFASTO  96
     *,/, 5X,1H*,4X                                                     TFASTO  97
     F,13H FFF                                                          TFASTO  98
     *,63X, 36H.                                  .,4X,1H*)             TFASTO  99
  110 FORMAT (                                                          TFASTO 100
     *    5X,1H*,4X                                                     TFASTO 101
     F,13H FFF                                                          TFASTO 102
     *,7X                                                               TFASTO 103
     A,13H      A                                                       TFASTO 104
     *,43X, 36H....................................,4X,1H*              TFASTO 105
     *,/, 5X,1H*,4X                                                     TFASTO 106
     F,13H FFF                                                          TFASTO 107
     *,7X                                                               TFASTO 108
     A,13H     AAA                                                      TFASTO 109
     *,43X, 36H.                                  .,4X,1H*)             TFASTO 110
  115 FORMAT (                                                          TFASTO 111
     *    5X,1H*,4X                                                     TFASTO 112
     F,13H FFF                                                          TFASTO 113
     *,7X                                                               TFASTO 114
     A,13H    AAAAA                                                     TFASTO 115
```

```
C                                                                        TFASTO     2
C45700, SUB  TFASTO (TITLE FOR FLUTTER AND STR. OPTIMIZATION PROGRAM)    TFASTO     3
C                                                                        TFASTO     4
C*********************************************************************** TFASTO     5
C                                                                        TFASTO     6
C***  SUBROUTINE TFASTO ************************************************ TFASTO     7
C                                                                        TFASTO     8
C***  OBJECTIVE  ******************************************************** TFASTO     9
C     ---------                                                        * TFASTO    10
C     PRINTS THE TITLE PAGE FOR FASTOP SYSTEM                          * TFASTO    11
C                                                                      * TFASTO    12
C*********************************************************************** TFASTO    13
C                                                                        TFASTO    14
      SUBROUTINE TFASTO                                                  TFASTO    15
C                                                                        TFASTO    16
      DIMENSION AFFDL(4)                                                 TFASTO    17
C                                                                        TFASTO    18
      COMMON /COMRWP/ ITAPER,ITAPEW,ITAPEP                               TFASTO    19
      COMMON /CLIST / KOUNT ,KPAGE ,LINES ,LINEST,KLABEL,KTPAGE,NPAGE    TFASTO    20
     1                ,KBPAGE,LINESG,KOUNTH                              TFASTO    21
      COMMON /CTABLE/ KTABLE,NPASS ,NROWS ,NCOLS ,NCOLST,KTABLO,NPAGEA   TFASTO    22
     1                ,ITAPET                                            TFASTO    23
      COMMON /CAFFDL/ AFFDL                                              TFASTO    24
C                                                                        TFASTO    25
C                                                                        TFASTO    26
C PREPARE TABLE OF CONTENTS                                              TFASTO    27
C                                                                        TFASTO    28
      KOUNT  =  LINES                                                    TFASTO    29
      CALL TITLES (-1)                                                   TFASTO    30
      NCOLS  =  0                                                        TFASTO    31
      NROWS  =  2                                                        TFASTO    32
      KTABLE =  2                                                        TFASTO    33
      CALL PTABLE (1,60,60                                               TFASTO    34
     1   H*****    ***     ****   *****    ***    ****     FLUTTER    )  TFASTO    35
      NROWS  =  0                                                        TFASTO    36
      KTABLE =  2                                                        TFASTO    37
      CALL PTABLE (1,60,60                                               TFASTO    38
     1   H*        *   *   *         *     *   *   *   *     AND      )  TFASTO    39
      KTABLE =  2                                                        TFASTO    40
      CALL PTABLE (1,60,60                                               TFASTO    41
     1   H****  - ***** -  ***   -   *   - *   * - ****   STRUCTURAL  )  TFASTO    42
      KTABLE =  2                                                        TFASTO    43
      CALL PTABLE (1,60,60                                               TFASTO    44
     1  'H*        *   *       *     *     *   *   *     OPTIMIZATION )  TFASTO    45
      KTABLE =  2                                                        TFASTO    46
      CALL PTABLE (2,60,60                                               TFASTO    47
     1   H*        *   *  ****       *      ***    *       PROGRAM    )  TFASTO    48
      KOUNT  =  LINES                                                    TFASTO    49
C                                                                        TFASTO    50
C                                                                        TFASTO    51
C LIST TITLE PAGE                                                        TFASTO    52
C                                                                        TFASTO    53
      WRITE (ITAPEW,100)                                                 TFASTO    54
      WRITE (ITAPEW,105)                                                 TFASTO    55
      WRITE (ITAPEW,110)                                                 TFASTO    56
      WRITE (ITAPEW,115)                                                 TFASTO    57
      WRITE (ITAPEW,120) AFFDL                                           TFASTO    58
```

```
EXTERNALS          TYPE    ARGS       REFERENCES
      DVALUE                3            112
      FOP                   0            196
      TFASTO                0            141
      TIMEB                 2            147
      WORDS                 3             98        99

STATEMENT LABELS            DEF LINE   REFERENCES
   0  132                     114          113
   0  140                     126          125

LOOPS  LABEL    INDEX      FROM-TO    LENGTH    PROPERTIES
56443  132      L          113 114       3B      INSTACK
56463  140      I          125 126       3B      INSTACK

COMMON BLOCKS    LENGTH      MEMBERS - BIAS NAME(LENGTH)
      COMRWP        3                0 ITAPER (1)            1 ITAPEW (1)            2 ITAPEP (1)
      CTMH         38                0 KTMH   (1)            1 LTMH   (1)            2 TMH    (36)
      MESAG         4                0 KMESAG (1)            1 KTITLE (1)            2 KTIME  (1)
                                     3 KTIMEL (1)
      CTFH         20                0 KTFH   (1)            1 LTFH   (1)            2 TFH    (18)
      CONSTS        2                0 NO     (1)            1 YES    (1)
      CLIST        11                0 KOUNT  (1)            1 KPAGE  (1)            2 LINES  (1)
                                     3 LINEST (1)            4 KLABEL (1)            5 KTPAGE (1)
                                     6 NPAGE  (1)            7 KBPAGE (1)            8 LINESG (1)
                                     9 KOUNTH (1)           10 KOUNTI (1)
      CTABLE        8                0 KTABLE (1)            1 NPASS  (1)            2 NROWS  (1)
                                     3 NCOLS  (1)            4 NCOLST (1)            5 KTABLO (1)
                                     6 NPAGEA (1)            7 ITAPET (1)
      REPORT        1                0 KREPOR (1)
      CFMTAO        3                0 FMTAO  (3)
      COMPUT        2                0 KOMPUT (1)            1 NCHARW (1)
      LABELS        6                0 KFLABO (1)            1 KDLABO (1)            2 KFLABI (1)
                                     3 KDLABI (1)            4 ITAPEL (1)            5 KLABEI (1)
      CAFFDL        4                0 AFFDL  (4)
      GENCOM     1578                0 DUMMY  (1578)
      FLPCOM    14400 ECS            0 GKECS  (3200)      3200 SOLECS (8000)     11200 AECS   (3200)
      BCOM       6400 ECS            0 BECS   (3200)      3200 BBECS  (3200)
      INCCOM     1802 ECS            0 GECS   (1750)      1750 BCOECS (50)        1800 NPMECS (1)
                                  1801 MSTRECS(1)
      STRCOM     5436 ECS            0 JSETECS(50)          50 JDIMECS(1)           51 LMKECS (2500)
                                  2551 NOTJECS(50)        2601 NTDMECS(1)         2602 LNDECS (50)
                                  2652 LDMECS (1)         2653 NOTTECS(50)        2703 ICNECS (1)
                                  2704 NDIMECS(1)         2705 XOECS  (35)        2740 XNECS  (35)
                                  2775 DELXECS(35)        2810 GROECS (35)        2845 GRNECS (35)
                                  2880 DELGECS(35)        2915 ZECS   (35)        2950 HOECS  (1225)
                                  4175 HNECS  (1225)      5400 HGRECS (35)        5435 ICNVECS(1)

STATISTICS
  PROGRAM LENGTH                3432B     1818
  BUFFER LENGTH                53120B    22096
  CM LABELED COMMON LENGTH      3220B     1680
  ECS LABELED COMMON LENGTH    66606B    28038
        52000B CM USED
```

```
VARIABLES      SN  TYPE            RELOCATION
     6  NPAGEA     INTEGER               CTABLE      REFS     51  DEFINED     123
     1  NPASS      INTEGER               CTABLE      REFS     51  DEFINED     124
  3410  NPMECS     INTEGER               INCCOM      REFS     67      74
     2  NROWS      INTEGER               CTABLE      REFS     51
  5051  NTDMECS    INTEGER               STRCOM      REFS     68      74
 56530  SHIFT    * REAL                              REFS     98
  6200  SOLECS     COMPLEX     ARRAY     FLPCOM      REFS     62      65      74
     2  TFH        REAL        ARRAY     CTFH        REFS     42      47
 56537  TMAIN      REAL        ARRAY                 REFS     41     115     116  DEFINED     96
     2  TMH        REAL        ARRAY     CTMH        REFS     41      45     112  DEFINED    114      115      116
  5264  XNECS      REAL        ARRAY     STRCOM      REFS     68      74
  5221  XOECS      REAL        ARRAY     STRCOM      REFS     68      74
     1  YES        INTEGER               CONSTS      REFS     37      48     146  DEFINED    103
  5543  ZECS       REAL        ARRAY     STRCOM      REFS     68      74

FILE NAMES         MODE
     0  INPUT
  2054  OUTPUT
  4130  TAPE16
  7260  TAPE17
 10334  TAPE18
 11410  TAPE19
 12464  TAPE20
 13540  TAPE21
 14614  TAPE22
 15670  TAPE23
 16744  TAPE24
 20020  TAPE25
 21074  TAPE26
 22150  TAPE27
 23224  TAPE28
 24300  TAPE29
 25354  TAPE30
 26430  TAPE31
 27504  TAPE32
 30560  TAPE33
 31634  TAPE34
 32710  TAPE35
 33764  TAPE36
 35040  TAPE37
 36114  TAPE39
 37170  TAPE40
 40244  TAPE41
 41320  TAPE42
 42374  TAPE43
 43450  TAPE44
 44524  TAPE45
 45600  TAPE47
 46654  TAPE48
 47730  TAPE49
  6204  TAPE5
 51004  TAPE50
 52060  TAPE57
 53134  TAPE58
 54210  TAPE59
  2054  TAPE6
```

```
VARIABLES      SN  TYPE            RELOCATION
     0  GECS       REAL      ARRAY   INCCOM       REFS       67       74
     0  GKECS      COMPLEX   ARRAY   FLPCOM       REFS       62       65        74
  5435  GRNECS     REAL      ARRAY   STRCOM       REFS       68       74
  5372  GROECS     REAL      ARRAY   STRCOM       REFS       68       74
 12430  HGRECS     REAL      ARRAY   STRCOM       REFS       68       74
 10117  HNECS      REAL      ARRAY   STRCOM       REFS       68       74
  5606  HOECS      REAL      ARRAY   STRCOM       REFS       68       74
 56532  I          INTEGER                        REFS    2*126   DEFINED     125
  5217  ICNECS     INTEGER           STRCOM       REFS       68       74
 12473  ICNVECS    INTEGER           STRCOM       REFS       68       74
     4  ITAPEL     INTEGER           LABELS       REFS       56
     2  ITAPEP     INTEGER           COMRWP       REFS       44
     0  ITAPER     INTEGER           COMRWP       REFS       44
     7  ITAPET     INTEGER           CTABLE       REFS       51   DEFINED     118
     1  ITAPEW     INTEGER           COMRWP       REFS       44   DEFINED     117
    62  JDIMECS    INTEGER           STRCOM       REFS       68       74
     0  JSETECS    INTEGER   ARRAY   STRCOM       REFS       68       74
     7  KBPAGE     INTEGER           CLIST        REFS       49   DEFINED     111
     3  KDLABI     INTEGER           LABELS       REFS       56
     1  KDLABO     INTEGER           LABELS       REFS       56
     2  KFLABI     INTEGER           LABELS       REFS       56
     0  KFLABO     INTEGER           LABELS       REFS       56
     5  KLABEI     INTEGER           LABELS       REFS       56
     4  KLABEL     INTEGER           CLIST        REFS       49
     0  KMESAG     INTEGER           MESAG        REFS       46
     0  KOMPUT     INTEGER           COMPUT       REFS       55
     0  KOUNT      INTEGER           CLIST        REFS       49   DEFINED     107
    11  KOUNTH     INTEGER           CLIST        REFS       49
    12  KOUNTI     INTEGER           CLIST        REFS       49
     1  KPAGE      INTEGER           CLIST        REFS       49   DEFINED     108
     0  KREPOR     INTEGER           REPORT       REFS       53   DEFINED     119
     0  KTABLE     INTEGER           CTABLE       REFS       51   DEFINED     120
     5  KTABLO     INTEGER           CTABLE       REFS       51   DEFINED     121
     0  KTFH       INTEGER           CTFH         REFS       47   DEFINED     104
     2  KTIME      INTEGER           MESAG        REFS       46   DEFINED     144       149
     3  KTIMEL     INTEGER           MESAG        REFS       46   DEFINED     146
     1  KTITLE     INTEGER           MESAG        REFS       46   DEFINED     145       150
     0  KTMH       INTEGER           CTMH         REFS       45
     5  KTPAGE     INTEGER           CLIST        REFS       49   DEFINED     110
 56531  L          INTEGER                        REFS      114   DEFINED     113
  5134  LDMECS     INTEGER           STRCOM       REFS       68       74
     2  LINES      INTEGER           CLIST        REFS       49      107   DEFINED       101
    10  LINESG     INTEGER           CLIST        REFS       49
     3  LINEST     INTEGER           CLIST        REFS       49   DEFINED     106
    63  LMKECS     INTEGER   ARRAY   STRCOM       REFS       68       74
  5052  LNDECS     INTEGER   ARRAY   STRCOM       REFS       68       74
     1  LTFH       INTEGER           CTFH         REFS       47   DEFINED     105
     1  LTMH       INTEGER           CTMH         REFS       45      112     113   DEFINED     100
  3411  MSTRECS    INTEGER           INCCOM       REFS       67       74
     1  NCHARW     INTEGER           COMPUT       REFS       55   DEFINED     134
     3  NCOLS      INTEGER           CTABLE       REFS       51
     4  NCOLST     INTEGER           CTABLE       REFS       51   DEFINED     122
  5220  NDIMECS    INTEGER           STRCOM       REFS       68       74
     0  NO         INTEGER           CONSTS       REFS       48      104   DEFINED       102
  4767  NOTJECS    INTEGER   ARRAY   STRCOM       REFS       68       74
  5135  NOTTECS    INTEGER   ARRAY   STRCOM       REFS       68       74
     6  NPAGE      INTEGER           CLIST        REFS       49   DEFINED     109
```

```
C                                                                      FASTOP   173
C     CALL SOP                                                         FASTOP   174
C                                                                      FASTOP   175
C********************************************************************* FASTOP   176
C********************************************************************* FASTOP   177
C********************************************************************* FASTOP   178
C********************************************************************* FASTOP   179
C********************************************************************* FASTOP   180
C*****                                                          ****** FASTOP   181
C*****                     FFFFF    OOO    PPPP                 ****** FASTOP   182
C*****                     F       O   O   P   P                ****** FASTOP   183
C*****                     FFFF  - O   O - PPPP                 ****** FASTOP   184
C*****                     F       O   O   P                    ****** FASTOP   185
C*****                     F        OOO    P                    ****** FASTOP   186
C*****                                                          ****** FASTOP   187
C********************************************************************* FASTOP   188
C********************************************************************* FASTOP   189
C********************************************************************* FASTOP   190
C********************************************************************* FASTOP   191
C********************************************************************* FASTOP   192
C                                                                      FASTOP   193
C                                                                      FASTOP   194
C FLUTTER OPTIMIZATION PACKAGE                                         FASTOP   195
C                                                                      FASTOP   196
      CALL FOP                                                         FASTOP   197
C                                                                      FASTOP   198
C********************************************************************* FASTOP   199
C********************************************************************* FASTOP   200
C********************************************************************* FASTOP   201
C********************************************************************* FASTOP   202
C********************************************************************* FASTOP   203
C                                                                      FASTOP   204
      STOP                                                             FASTOP   205
      END                                                              FASTOP   206
```

SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS		DEF LINE	REFERENCES
56417	MAIN	3	

VARIABLES		SN	TYPE		RELOCATION					
25700	AECS		COMPLEX	ARRAY	FLPCOM	REFS	62	65	74	
0	AFFDL		REAL	ARRAY	CAFFDL	REFS	38	57	DEFINED	126
6200	BBECS		COMPLEX	ARRAY	BCOM	REFS	63	66	74	
3326	BCOECS		REAL	ARRAY	INCCOM	REFS	67	74		
0	BECS		COMPLEX	ARRAY	BCOM	REFS	63	66	74	
56522	BLANK		REAL			REFS	112	DEFINED	94	
56533	DATE		REAL	ARRAY		REFS	39	126	DEFINED	97
5500	DELGECS		REAL	ARRAY	STRCOM	REFS	68	74		
5327	DELXECS		REAL	ARRAY	STRCOM	REFS	68	74		
56523	DOTS		REAL			REFS	114	DEFINED	95	
0	DUMMY		REAL	ARRAY	GENCOM	REFS	60			
0	FMTAO		REAL	ARRAY	CFMTAO	REFS	40	54	99	

```
      TMH( 9,1) =  TMAIN(1)                                             FASTOP   116
      TMH(10,1) =  TMAIN(2)                                             FASTOP   117
      ITAPEW =  6                                                       FASTOP   118
      ITAPET =  19                                                      FASTOP   119
      KREPOR =  1                                                       FASTOP   120
      KTABLE =  2                                                       FASTOP   121
      KTABLO =  2                                                       FASTOP   122
      NCOLST =  60                                                      FASTOP   123
      NPAGEA  =  0                                                      FASTOP   124
      NPASS   =  1                                                      FASTOP   125
      DO 140 I=1,4                                                      FASTOP   126
  140 AFFDL(I) = DATE(I)                                                FASTOP   127
C                                                                       FASTOP   128
CIBM  BEGINNING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS     FASTOP   129
C     NCHARW =  4                                                       FASTOP   130
CIBM  ENDING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS        FASTOP   131
C                                                                       FASTOP   132
C                                                                       FASTOP   133
CCDC  BEGINNING OF STATEMENTS ASSOCIATED WITH CDC COMPUTER PROGRAMS     FASTOP   134
      NCHARW =  10                                                      FASTOP   135
CCDC  ENDING OF STATEMENTS ASSOCIATED WITH CDC COMPUTER PROGRAMS        FASTOP   136
C                                                                       FASTOP   137
C                                                                       FASTOP   138
C                                                                       FASTOP   139
C PRINT FASTOP TITLE                                                    FASTOP   140
C                                                                       FASTOP   141
      CALL TFASTO                                                       FASTOP   142
C                                                                       FASTOP   143
C                                                                       FASTOP   144
      KTIME  =  1                                                       FASTOP   145
      KTITLE =  1                                                       FASTOP   146
      KTIMEL =  YES                                                     FASTOP   147
      CALL TIMEB (25,25                                                 FASTOP   148
     1   HFROM FASTOP, INITIAL TIME)                                    FASTOP   149
      KTIME  =  0                                                       FASTOP   150
      KTITLE =  2                                                       FASTOP   151
C                                                                       FASTOP   152
C*********************************************************************** FASTOP   153
C*********************************************************************** FASTOP   154
C*********************************************************************** FASTOP   155
C*********************************************************************** FASTOP   156
C*********************************************************************** FASTOP   157
C*****                                                           ****** FASTOP   158
C*****                  SSSS    OOO    PPPP                      ****** FASTOP   159
C*****                 S       O   O   P   P                     ****** FASTOP   160
C*****                  SSS  - O   O - PPPP                      ****** FASTOP   161
C*****                     S   O   O   P                         ****** FASTOP   162
C*****                 SSSS     OOO    P                         ****** FASTOP   163
C*****                                                           ****** FASTOP   164
C*********************************************************************** FASTOP   165
C*********************************************************************** FASTOP   166
C*********************************************************************** FASTOP   167
C*********************************************************************** FASTOP   168
C*********************************************************************** FASTOP   169
C                                                                       FASTOP   170
C                                                                       FASTOP   171
```

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      C                                                                     FASTOP    59
      CCDC                                                                  FASTOP    60
            COMMON /GENCOM/ DUMMY(1578)                                     FASTOP    61
                                                                            FASTOP    62
            COMPLEX GKECS(40,40),AECS(40,40),SOLECS(40,100)                 FASTOP    63
            COMPLEX BECS(40,40),BBECS(40,40)                                FASTOP    64
                                                                            FASTOP    65
            COMMON /FLPCOM/ GKECS,SOLECS,AECS                               FASTOP    66
            COMMON /BCOM/   BECS,BBECS                                      FASTOP    67
            COMMON /INCCOM/ GECS(35,50),BCOECS(50),NPMECS,MSTRECS           FASTOP    68
            COMMON /STRCOM/ JSETECS(50),JDIMECS,LMKECS(50,50),NOTJECS(50),  FASTOP    69
           1        NTDMECS,LNDECS(50),LDMECS,NOTTECS(50),ICNECS,NDIMECS,   FASTOP    70
           2        XOECS(35),XNECS(35),DELXECS(35),GROECS(35),GRNECS(35),  FASTOP    71
           3        DELGECS(35),ZECS(35),HOECS(35,35),HNECS(35,35),HGRECS(35), FASTOP    72
           4        ICNVECS                                                 FASTOP    73
                                                                            FASTOP    74
            LEVEL 3, GKECS,SOLECS,AECS,BECS,BBECS,GECS,BCOECS,NPMECS,MSTRECS, FASTOP    75
           1         JSETECS,JDIMECS,LMKECS,NOTJECS,NTDMECS,LNDECS,LDMECS,  FASTOP    76
           2         NOTTECS,ICNECS,NDIMECS,XOECS,XNECS,DELXECS,GROECS,GRNECS, FASTOP    77
           3         DELGECS,ZECS,HOECS,HNECS,HGRECS,ICNVECS                FASTOP    78
      CCDC                                                                  FASTOP    79
      C                                                                     FASTOP    80
      CIBM  BEGINNING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS   FASTOP    81
      C                                                                     FASTOP    82
      C EXTENDED ERROR HANDLING PACKAGE                                     FASTOP    83
      C 100 CONTINUE                                                        FASTOP    84
      C     CALL ERRSET (207,0,0,2,ERROR,301)                               FASTOP    85
      C     CALL ERRSET (208,0,0,2,1    ,0)                                 FASTOP    86
      C     CALL ERRSET (210,0,0,2,1    ,0)                                 FASTOP    87
      C     CALL ERRSET (215,0,0,2,1    ,0)                                 FASTOP    88
      CIBM  ENDING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS      FASTOP    89
      C                                                                     FASTOP    90
      C                                                                     FASTOP    91
      C                                                                     FASTOP    92
      C INITIAL CONDITIONS                                                  FASTOP    93
      C                                                                     FASTOP    94
            DATA BLANK  /4H    /                                            FASTOP    95
            DATA DOTS   /4H..../                                            FASTOP    96
            DATA TMAIN /4H FAS,4HTOP /                                      FASTOP    97
            DATA DATE /4H    ,4HJULY,4H 197,4H5    /                        FASTOP    98
            CALL WORDS (SHIFT,1,4H(10X)                                     FASTOP    99
            CALL WORDS (FMTAO,3,12H(10X,18A4)  )                            FASTOP   100
            LTMH   =  18                                                    FASTOP   101
            LINES  =  54                                                    FASTOP   102
            NO     =  1                                                     FASTOP   103
            YES    =  2                                                     FASTOP   104
            KTFH   =  NO                                                    FASTOP   105
            LTFH   =  18                                                    FASTOP   106
            LINEST =  4                                                     FASTOP   107
            KOUNT  =  LINES                                                 FASTOP   108
            KPAGE  =  2                                                     FASTOP   109
            NPAGE  =  0                                                     FASTOP   110
            KTPAGE =  2                                                     FASTOP   111
            KBPAGE =  2                                                     FASTOP   112
            CALL DVALUE (TMH,BLANK,2*LTMH)                                  FASTOP   113
            DO 132 L=1,LTMH                                                 FASTOP   114
        132 TMH( L,1) = DOTS                                                FASTOP   115
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VARIABLES      SN  TYPE            RELOCATION
   10  LINESG    INTEGER            CLIST         REFS          19
    3  LINEST    INTEGER            CLIST         REFS          19
    3  NCOLS     INTEGER            CTABLE        REFS          21    DEFINED       30
    4  NCOLST    INTEGER            CTABLE        REFS          21
    6  NPAGE     INTEGER            CLIST         REFS          19
    6  NPAGEA    INTEGER            CTABLE        REFS          21
    1  NPASS     INTEGER            CTABLE        REFS          21
    2  NROWS     INTEGER            CTABLE        REFS          21    DEFINED       31        35
       VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS           TYPE    ARGS        REFERENCES
       PTABLE                  3              33         37         40         43        46
       TITLES                  1              29

STATEMENT LABELS               DEF LINE   REFERENCES
  251  100      FMT               77          53
  302  105      FMT               89          54
  331  110      FMT               99          55
  354  115      FMT              110          56
  377  120      FMT              121          57
  421  125      FMT              132          58
  450  130      FMT              147          59
  467  135      FMT              162          60
  506  140      FMT              177          61
  530  145      FMT              196          62
  547  150      FMT              211          63
  566  155      FMT              226          64
  611  160      FMT              245          65
  630  165      FMT              260          66
  647  170      FMT              275          67
  671  175      FMT              294          €9
  710  180      FMT              309          69
  727  185      FMT              324          70
  757  190      FMT              341          71
 1004  195      FMT              356          72
 1035  200      FMT              373          73
 1066  205      FMT              390          74
 1125  210      FMT              409          75
 1157  215      FMT              425          76

COMMON BLOCKS    LENGTH      MEMBERS - BIAS NAME(LENGTH)
       COMRWP        3                 0 ITAPER (1)               1 ITAPEW (1)               2 ITAPEP (1)
       CLIST        10                 0 KOUNT  (1)               1 KPAGE  (1)               2 LINES  (1)
                                       3 LINEST (1)               4 KLABEL (1)               5 KTPAGE (1)
                                       6 NPAGE  (1)               7 KBPAGE (1)               8 LINESG (1)
                                       9 KOUNTH (1)
       CTABLE        8                 0 KTABLE (1)               1 NPASS  (1)               2 NROWS  (1)
                                       3 NCOLS  (1)               4 NCOLST (1)               5 KTABLO (1)
                                       6 NPAGEA (1)               7 ITAPET (1)
       CAFFDL        4                 0 AFFDL  (4)

STATISTICS
  PROGRAM LENGTH                 1231B      665
  CM LABELED COMMON LENGTH         31E       25
         52000B CM USED
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C                                                                       FOP       2
C45700, SUB. FOP (FLUTTER OPTIMIZATION PACKAGE                          FOP       3
C                                                                       FOP       4
C*********************************************************************** FOP       5
C*********************************************************************** FOP       6
C*********************************************************************** FOP       7
C*********************************************************************** FOP       8
C*********************************************************************** FOP       9
C*****                                                           ****** FOP      10
C*****                    FFFFF    OOO    PPPP                   ****** FOP      11
C*****                    F       O   O   P   P                  ****** FOP      12
C*****                    FFFF  - O   O - PPPP                   ****** FOP      13
C*****                    F       O   O   P                      ****** FOP      14
C*****                    F        OOO    P                      ****** FOP      15
C*****                                                           ****** FOP      16
C***************************************************** ***************** FOP      17
C*********************************************************************** FOP      18
C*********************************************************************** FOP      19
C*********************************************************************** FOP      20
C*********************************************************************** FOP      21
C                                                                     * FOP      22
C*********************************************************************** FOP      23
C                                                                     * FOP      24
C***  COMPUTER VERSION  ************************************************ FOP      25
C     ----------------                                                * FOP      26
C     IBM COMPUTER PROGRAM VERSION                                    * FOP      27
C                                                                     * FOP      28
C     FORTRAN STATEMENTS CONTAINED WITHIN THE TWO CARDS IDENTIFIED    * FOP      29
C     BY CIBM IN COLUMNS ONE TO FOUR ARE ASSOCIATED WITH THE IBM      * FOP      30
C     COMPUTER AND SHOULD BE LEFT BLANK.                              * FOP      31
C     FORTRAN STATEMENTS CONTAINED WITHIN THE TWO CARDS IDENTIFIED    * FOP      32
C     BY CCDC IN COLUMNS ONE TO FOUR ARE ASSOCIATED WITH THE CDC      * FOP      33
C     COMPUTER AND SHOULD HAVE A C IN COLUMN ONE.                     * FOP      34
C                                                                     * FOP      35
C     CDC COMPUTER PROGRAM VERSION                                    * FOP      36
C                                                                     * FOP      37
C     FORTRAN STATEMENTS CONTAINED WITHIN THE TWO CARDS IDENTIFIED    * FOP      38
C     BY CCDC IN COLUMNS ONE TO FOUR ARE ASSOCIATED WITH THE CDC      * FOP      39
C     COMPUTER AND SHOULD BE LEFT BLANK.                              * FOP      40
C     FORTRAN STATEMENTS CONTAINED WITHIN THE TWO CARDS IDENTIFIED    * FOP      41
C     BY CIBM IN COLUMNS ONE TO FOUR ARE ASSOCIATED WITH THE IBM      * FOP      42
C     COMPUTER AND SHOULD HAVE A C IN COLUMN ONE.                     * FOP      43
C                                                                     * FOP      44
C***  OBJECTIVE  ******************************************************* FOP      45
C     ---------                                                       * FOP      46
C     FLUTTER ANALYSIS AND/OR OPTIMIZATION PACKAGE                      FOP      47
C                                                                     * FOP      48
C     PERFORM FLUTTER ANALYSIS AND/OR OPTIMIZATION BY EXECUTING         FOP      49
C     THE DESIRED COMBINATION OF THE FOLLOWING MODULES.                 FOP      50
C         1.  VIBRATION ANALYSIS                                      * FOP      51
C         2.  FLUTTER ANALYSIS                                        * FOP      52
C                                                                     * FOP      53
C                                                                     * FOP      54
C***  SUMMARY OF SYMBOLS  ********************************************** FOP      55
C     ------------------                                              * FOP      56
C                                                                     * FOP      57
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      C     INPUT DATA CONTROL WORD OPTIONS FOR PERFORMING CERTAIN ANALYSES  * FOP      59
      C     AND/OR OPTIMIZATIONS.                                            * FOP      60
      C                                                                      * FOP      61
      C     VALUES ENTERED AS DATA HAVE THE FOLLOWING GENERAL FUNCTION ...   * FOP      62
      C     KLUE( I) = O, DO NOT PERFORM THE I'TH ANALYSIS AND/OR            * FOP      63
      C                   OPTIMIZATION.                                      * FOP      64
      C              = I, PERFORM THE I'TH ANALYSIS AND/OR OPTIMZATION       * FOP      65
      C                                                                      * FOP      66
      C     WHERE THE SPECIFIC FUNCTION OF EACH VARIABLE IS ...              * FOP      67
      C     KLUE( 1) = O, DUMMY OPTION                                       * FOP      68
      C     KLUE( 2) = O, DUMMY OPTION                                       * FOP      69
      C     KLUE( 3) = O, DO NOT PERFORM VIBRATION ANALYSS                   * FOP      70
      C              = 3, PERFORM VIBRATION ANALYSIS                         * FOP      71
      C     KLUE( 4) = O, DO NOT PERFORM FLUTTER ANALYSIS                    * FOP      72
      C              = 4, PERFORM FLUTTER ANALYSIS                           * FOP      73
      C     KLUE( 5) = O, DUMMY OPTION                                       * FOP      74
      C     KLUE( 6) = O, DUMMY OPTION                                       * FOP      75
      C     KLUE( 7) = O, DO NOT PERFORM FLUTTER OPTIMIZATION                * FOP      76
      C              = 7, PERFORM FLUTTER OPTIMIZATION                       * FOP      77
      C     KLUE( 8) = O, RESULTS ARE NOT TO BE INCLUDED IN A REPORT         * FOP      78
      C              = 8, RESULTS ARE TO BE INCLUDED IN A REPORT (THEREFORE, * FOP      79
      C                   WHERE APPROPRIATE, RESULTS WILL BE LISTED ON EIGHT * FOP      80
      C                   AND ONE HALF BY ELEVEN PAPER.)                     * FOP      81
      C     KLUE( 9) = O, DO NOT LIST LABELS OF FILES GENERATED BY DSIO      * FOP      82
      C                   (DISK SEQUENTIAL INPUT/OUTPUT).                    * FOP      83
      C              = 9, LIST LABELS OF FILES GENERATED BY DSIO             * FOP      84
      C                   (DISK SEQUENTIAL INPUT/OUTPUT).                    * FOP      85
      C     KLUE(10) = O, DO NOT LIST MESSAGES UPON ENTERING AND LEAVING     * FOP      86
      C                   SUBROUTINES                                        * FOP      87
      C              =10, LIST MESSAGES UPON ENTERING AND LEAVING            * FOP      88
      C                   SUBROUTINES                                        * FOP      89
      C     KLUE(11) = O, DO NOT LIST MAIN HEADING                           * FOP      90
      C              =11, LIST MAIN HEADING ENTERED AS CARD DATA             * FOP      91
      C     KLUE(12) = O, DO NOT LIST SUBHEADING                             * FOP      92
      C              =12, LIST SUBHEADING ENTERED AS CARD DATA               * FOP      93
      C     KLUE(13) = O, DO NOT LIST INTERMEDIATE LABELS                    * FOP      94
      C              =13, LIST INTERMEDIATE LABELS                           * FOP      95
      C     KLUE(14) = O, DO NOT LIST COMPUTER TIMES                         * FOP      96
      C               14, LIST COMPUTER TIMES                                * FOP      97
      C     KLUE(15) = O, DUMMY OPTION                                         FOP      98
      C     KLUE(16) = O, DUMMY OPTION                                         FOP      99
      C     KLUE(17) = O, DUMMY OPTION                                         FOP     100
      C     KLUE(18) = O, DUMMY OPTION                                         FOP     101
      C     KLUE(19) = O, DUMMY OPTION                                         FOP     102
      C     KLUE(20) = O, DUMMY OPTION                                         FOP     103
      C     KLUE(21) = O, DUMMY OPTION                                         FOP     104
      C     KLUE(22) = O, DUMMY OPTION                                         FOP     105
      C     KLUE(23) = O, DUMMY OPTION                                         FOP     106
      C     KLUE(24) = O, DUMMY OPTION                                         FOP     107
      C     KLUE(25) = O, DUMMY OPTION                                         FOP     108
      C     KLUE(26) = O, THIS IS INITIAL PASS THROGH FOP                      FOP     109
      C              =26, THIS IS NOT THE FIRST PASS THROUGH FOP               FOP     110
      C     KLUE(27) = O, VIBRATION ANALYSIS WILL USE STIFFNESS MATRIX         FOP     111
      C              =27. VIBRATION ANALYSIS WILL USE FLEXIBILITY MATRIX       FOP     112
      C     KLUE(28) = O, INITIAL DYNAMIC MASS MATRIX IS (WAS) SUPPLIED BY     FOP     113
      C                   USER IN FIRST FOP PASS                               FOP     114
      C              =28  USE FULLY AUTOMATED MASS OPTION TO COMPUTE DYNAMIC   FOP     115
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      C                    MASS MATRIX                                          FOP   116
      C     KLUE(29) = 0,  THERE ARE NO (USER-SUPPLIED) FIXED MASS ITEMS TO BE  FOP   117
      C                    CONSIDERED IN FULLY AUTOMATED MASS OPTION            FOP   118
      C              =29,  FIXED MASS ITEMS ARE TO BE CONSIDERED IN THE FULLY   FOP   119
      C                    AUTOMATED MASS OPTION                                FOP   120
      C     KLUE(30) = 0,  THE FIXED MASS ITEMS IN THE FULLY AUTOMATED MASS     FOP   121
      C                    OPTION DO NOT CONTRIBUTE TO THE OFF-DIAGONAL TERMS   FOP   122
      C                    OF THE STRUCTURAL MASS MATRIX                        FOP   123
      C              =30,  FIXED MASS ITEMS IN THE FULLY AUTOMATED MASS OPTION  FOP   124
      C                    DO CONTRIBUTE TO THE OFF-DIAGONAL TERMS OF THE       FOP   125
      C                    STRUCTURAL MASS MATRIX                               FOP   126
      C     KLUE(31) = 0,  THERE ARE NO MASS BALANCE VARIABLES PRESENT          FOP   127
      C              =31,  MASS BALANCE VARIABLES ARE PRESENT IN THE PROBLEM    FOP   128
      C     KLUE(32) = 0,  DO NOT SUPERSEDE EXISTING MASS BALANCE DATA WITH     FOP   129
      C                    NEW DATA                                             FOP   130
      C              =32,  NEW MASS BALANCE DATA ARE BEING SUPPLIED TO          FOP   131
      C                    OVERRIDE EXISTING DATA                               FOP   132
      C     KLUE(33) = 0,  IN THE MOST RECENT SOP STEP, THAT PROGRAM WAS SIMPLY FOP   133
      C                    USED TO COMPUTE THE DYNAMIC FLEXIBILITY MATRIX OR    FOP   134
      C                    THE STRUCTURAL STIFFNESS MATRIX. THAT IS, SOP WAS    FOP   135
      C                    NOT USED TO ANALYZE OR REDESIGN.                     FOP   136
      C              =33,  IN THE LAST PASS THROUGH SOP, THAT PROGRAM DID       FOP   137
      C                    ANALYZE OR REDESIGN THE STRUCTURE                    FOP   138
      C     KLUE(34) = 0.  COMPUTE FLUTTER VELOCITY DERIVATIVES FOR ALL         FOP   139
      C                    STRUCTURAL MEMBERS AND MASS BALANCE VARIABLES, BUT   FOP   140
      C                    DO NOT REDESIGN THE STRUCTURE FOR FLUTTER            FOP   141
      C              =34,  COMPUTE FLUTTER VELOCITY DERIVATIVES ONLY FOR        FOP   142
      C                    FLUTTER REDESIGN VARIABLES (SEE KLUE(36)), PERFORM   FOP   143
      C                    FLUTTER REDESIGN(S), AND PREPARE OUTPUT TAPES        FOP   144
      C                    REQUIRED FOR SUBSEQUENT USE BY SOP AND FOP           FOP   145
      C     KLUE(35) = 0,  THERE ARE NO NON-OPTIMUM WEIGHT FACTORS IN THE       FOP   146
      C                    PROBLEM                                              FOP   147
      C              =35,  NON-OPTIMUM WEIGHT FACTORS ARE PRESENT IN THE        FOP   148
      C                    PROBLEM                                              FOP   149
      C     KLUE(36) = 0,  DO NOT EXCLUDE ANY STRUCTURAL MEMBERS FROM THE       FOP   150
      C                    FLUTTER REDESIGN PROCESS                             FOP   151
      C              =36,  EXCLUDE SPECIFIED STRUCTURAL MEMBERS FROM THE        FOP   152
      C                    FLUTTER REDESIGN PROCESS                             FOP   153
      C     KLUE(37) = 0,  PERFORM A CANTILEVER VIBRATION ANALYSIS              FOP   154
      C              =37,  PERFORM A FREE-FREE VIBRATION ANALYSIS               FOP   155
      C                                                                       * FOP   156
      C     THE VALUES OF THE CARD INPUT DATA CONTROL WORD OPTIONS (KLUE (J))* FOP   157
      C     GIVEN ABOVE ARE ENTERED INTO THE PROGRAM BY THE SUBROUTINE CLUES * FOP   158
      C     AND THEN CHANGED, WITHIN THE SUBROUTINE CLUES, TO A NEW SET OF   * FOP   159
      C     NUMERICAL VALUES                                                 * FOP   160
      C     A VALUE OF ONE (CORRESPONDING TO THE ORIGINAL ZERO VALUE)        * FOP   161
      C     INDICATES THAT THE OPTION IS TO BE DELETED WHEREAS A VALUE OF TWO* FOP   162
      C     (CORRESPONDING TO THE ORIGINAL I'TH VALUE) INDICATES THAT THE    * FOP   163
      C     OPTION IS TO BE EXERCISED.                                       * FOP   164
      C     FINALLY, FOR PROGRAMMING CONVENIENCE, A NEW SET OF OPTIONS       * FOP   165
      C     REFERRED TO AS PROGRAM CONTROL WORD OPTIONS (KXXXXX) ARE DEFINED * FOP   166
      C     TO BE EQUIVALENT TO THE CARD INPUT CONTROL WORD OPTIONS.         * FOP   167
      C                                                                       * FOP   168
      C     KLUE (I) = 0, IS CHANGED TO 1, AND CORRESPONDS TO  KXXXXX = 1   * FOP   169
      C     KLUE (I) = I, IS CHANGED TO 2, AND CORRESPONDS TO  KXXXXX = 2   * FOP   170
      C                                                                       * FOP   171
      C     THE SPECIFIC RELATIONSHIP OF THE CARD INPUT DATA AND PROGRAM     * FOP   172
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C      CONTROL WORD OPTIONS IS GIVEN BELOW                               * FOP       173
C                                                                        * FOP       174
C      KLUE ( 3)  =  KANAV                                               * FOP       175
C      KLUE ( 4)  =  KANAF                                               * FOP       176
C      KLUE ( 7)  =  KOPTF                                               * FOP       177
C      KLUE ( 8)  =  KREPOR                                              * FOP       178
C      KLUE ( 9)  =  KLABEL                                              * FOP       179
C      KLUE (10)  =  KMESAG                                              * FOP       180
C      KLUE (11)  =  KTMH                                                * FOP       181
C      KLUE (12)  =  KTSH                                                * FOP       182
C      KLUE(13)  =  KLABEI                                               * FOP       183
C      KLUE(14)  =  KTIMEL                                               * FOP       184
C      KLUE (26)  =  KPASS                                                 FOP       185
C      KLUE (27)  =  KRED                                                  FOP       186
C      KLUE (28)  =  KMASSA                                                FOP       187
C      KLUE (29)  =  KMASSD                                                FOP       188
C      KLUE (30)  =  KMASSO                                                FOP       189
C      KLUE (31)  =  KMASSB                                                FOP       190
C      KLUE (32)  =  KBALUP                                                FOP       191
C      KLUE (33)  =  KSTRER                                                FOP       192
C      KLUE (34)  =  KRESIZ                                                FOP       193
C      KLUE (35)  =  KNOPT                                                 FOP       194
C      KLUE (36)  =  KIDFIX                                                FOP       195
C      KLUE (37)  =  KFREE                                                 FOP       196
C                                                                        * FOP       197
C.... KLUE(I) ...... INTERMEDIATE, (I = LKLUE+1,....,2*LKLUE)            * FOP       198
C      PROGRAM CONTROL WORD OPTION FOR INDICATING WHICH OF THE ANALYSES  * FOP       199
C      AND/OR OPTIMIZATIONS HAVE BEEN PERFORMED.                         * FOP       200
C                                                                        * FOP       201
C      VALUES DEFINED WITHIN THE PROGRAM HAVE THE FOLLOWING GENERAL      * FOP       202
C      FUNCTION ...                                                      * FOP       203
C      KLUE(I) = O, THE I'TH ANALYSIS AND/OR OPTIMIZATION HAS NOT BEEN   * FOP       204
C                   PERFORMED IN THE CURRENT RUN.                        * FOP       205
C              = I, THE I'TH ANALYSIS AND/OR OPTIMIZATION HAS BEEN       * FOP       206
C                   PERFORMED IN THE CURRENT RUN.                        * FOP       207
C                                                                        * FOP       208
C      WHERE THE SPECIFIC FUNCTION OF EACH VARIABLE IS ASSOCIATED WITH   * FOP       209
C      THE SPECIFIC FUNCTION OF THE VARIABLE KLUE(I) FOR                 * FOP       210
C      I = 1,...,LKLUE.                                                  * FOP       211
C                                                                        * FOP       212
C.... KLUEF(I) .... INPUT (SEE SUBROUTINE FLUTA)                         * FOP       213
C      INPUT DATA CONTROL WORD OPTION FOR PERFORMING FLUTTER ANALYSIS.   * FOP       214
C                                                                        * FOP       215
C.... KLUEV(I) ..... INPUT (SEE SUBROUTINE VIBRA)                        * FOP       216
C      INPUT DATA CONTROL WORD OPTION FOR PERFORMING VIBRATION ANALYSIS.* FOP       217
C                                                                        * FOP       218
C. .. TMH(I) ....... INTERMEDIATE                                        * FOP       219
C      TITLE CONSISTING OF TWO CARDS FOR LISTING AT THE TOP OF EACH      * FOP       220
C      PAGE OF THE LISTED RESULTS.                                       * FOP       221
C                                                                        * FOP       222
C                                                                        * FOP       223
C************************************************************************* FOP       224
C                                                                          FOP       225
       SUBROUTINE FOP                                                      FOP       226
C                                                                          FOP       227
       INTEGER YES                                                         FOP       228
C                                                                          FOP       229
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C                   MASS MATRIX                                          FOP     116
C     KLUE(29) = O. THERE ARE NO (USER-SUPPLIED) FIXED MASS ITEMS TO BE  FOP     117
C                   CONSIDERED IN FULLY AUTOMATED MASS OPTION            FOP     118
C              =29. FIXED MASS ITEMS ARE TO BE CONSIDERED IN THE FULLY   FOP     119
C                   AUTOMATED MASS OPTION                                FOP     120
C     KLUE(30) = O. THE FIXED MASS ITEMS IN THE FULLY AUTOMATED MASS     FOP     121
C                   OPTION DO NOT CONTRIBUTE TO THE OFF-DIAGONAL TERMS   FOP     122
C                   OF THE STRUCTURAL MASS MATRIX                        FOP     123
C              =30. FIXED MASS ITEMS IN THE FULLY AUTOMATED MASS OPTION  FOP     124
C                   DO CONTRIBUTE TO THE OFF-DIAGONAL TERMS OF THE       FOP     125
C                   STRUCTURAL MASS MATRIX                               FOP     126
C     KLUE(31) = O. THERE ARE NO MASS BALANCE VARIABLES PRESENT          FOP     127
C              =31. MASS BALANCE VARIABLES ARE PRESENT IN THE PROBLEM    FOP     128
C     KLUE(32) = O. DO NOT SUPERSEDE EXISTING MASS BALANCE DATA WITH     FOP     129
C                   NEW DATA                                             FOP     130
C              =32. NEW MASS BALANCE DATA ARE BEING SUPPLIED TO          FOP     131
C                   OVERRIDE EXISTING DATA                               FOP     132
C     KLUE(33) = O. IN THE MOST RECENT SOP STEP, THAT PROGRAM WAS SIMPLY FOP     133
C                   USED TO COMPUTE THE DYNAMIC FLEXIBILITY MATRIX OR    FOP     134
C                   THE STRUCTURAL STIFFNESS MATRIX. THAT IS, SOP WAS    FOP     135
C                   NOT USED TO ANALYZE OR REDESIGN.                     FOP     136
C              =33. IN THE LAST PASS THROUGH SOP, THAT PROGRAM DID       FOP     137
C                   ANALYZE OR REDESIGN THE STRUCTURE                    FOP     138
C     KLUE(34) = O. COMPUTE FLUTTER VELOCITY DERIVATIVES FOR ALL         FOP     139
C                   STRUCTURAL MEMBERS AND MASS BALANCE VARIABLES, BUT   FOP     140
C                   DO NOT REDESIGN THE STRUCTURE FOR FLUTTER            FOP     141
C              =34. COMPUTE FLUTTER VELOCITY DERIVATIVES ONLY FOR        FOP     142
C                   FLUTTER REDESIGN VARIABLES (SEE KLUE(36)), PERFORM   FOP     143
C                   FLUTTER REDESIGN(S), AND PREPARE OUTPUT TAPES        FOP     144
C                   REQUIRED FOR SUBSEQUENT USE BY SOP AND FOP           FOP     145
C     KLUE(35) = O. THERE ARE NO NON-OPTIMUM WEIGHT FACTORS IN THE       FOP     146
C                   PROBLEM                                              FOP     147
C              =35. NON-OPTIMUM WEIGHT FACTORS ARE PRESENT IN THE        FOP     148
C                   PROBLEM                                              FOP     149
C     KLUE(36) = O. DO NOT EXCLUDE ANY STRUCTURAL MEMBERS FROM THE       FOP     150
C                   FLUTTER REDESIGN PROCESS                             FOP     151
C              =36. EXCLUDE SPECIFIED STRUCTURAL MEMBERS FROM THE        FOP     152
C                   FLUTTER REDESIGN PROCESS                             FOP     153
C     KLUE(37) = O. PERFORM A CANTILEVER VIBRATION ANALYSIS              FOP     154
C              =37. PERFORM A FREE-FREE VIBRATION ANALYSIS               FOP     155
C                                                                      * FOP     156
C     THE VALUES OF THE CARD INPUT DATA CONTROL WORD OPTIONS (KLUE (J))* FOP     157
C     GIVEN ABOVE ARE ENTERED INTO THE PROGRAM BY THE SUBROUTINE CLUES * FOP     158
C     AND THEN CHANGED, WITHIN THE SUBROUTINE CLUES, TO A NEW SET OF   * FOP     159
C     NUMERICAL VALUES                                                 * FOP     160
C     A VALUE OF ONE (CORRESPONDING TO THE ORIGINAL ZERO VALUE)        * FOP     161
C     INDICATES THAT THE OPTION IS TO BE DELETED WHEREAS A VALUE OF TWO* FOP     162
C     (CORRESPONDING TO THE ORIGINAL I'TH VALUE) INDICATES THAT THE    * FOP     163
C     OPTION IS TO BE EXERCISED.                                       * FOP     164
C     FINALLY, FOR PROGRAMMING CONVENIENCE, A NEW SET OF OPTIONS       * FOP     165
C     REFERRED TO AS PROGRAM CONTROL WORD OPTIONS (KXXXXX) ARE DEFINED * FOP     166
C     TO BE EQUIVALENT TO THE CARD INPUT CONTROL WORD OPTIONS.         * FOP     167
C                                                                      * FOP     168
C     KLUE (I) = O, IS CHANGED TO 1, AND CORRESPONDS TO  KXXXXX = 1    * FOP     169
C     KLUE (I) = I, IS CHANGED TO 2, AND CORRESPONDS TO  KXXXXX = 2    * FOP     170
C                                                                      * FOP     171
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C     CONTROL WORD OPTIONS IS GIVEN BELOW.                            * FOP     173
C                                                                     * FOP     174
C     KLUE ( 3)  =  KANAV                                             * FOP     175
C     KLUE ( 4)  =  KANAF                                             * FOP     176
C     KLUE ( 7)  =  KOPTF                                             * FOP     177
C     KLUE ( 8)  =  KREPOR                                            * FOP     178
C     KLUE ( 9)  =  KLABEL                                            * FOP     179
C     KLUE (10)  =  KMESAG                                            * FOP     180
C     KLUE (11)  =  KTMH                                              * FOP     181
C     KLUE (12)  =  KTSH                                              * FOP     182
C     KLUE(13)  =  KLABEI                                             * FOP     183
C     KLUE(14)  =  KTIMEL                                             * FOP     184
C     KLUE (26)  =  KPASS                                               FOP     185
C     KLUE (27)  =  KRED                                                FOP     186
C     KLUE (28)  =  KMASSA                                              FOP     187
C     KLUE (29)  =  KMASSD                                              FOP     188
C     KLUE (30)  =  KMASSO                                              FOP     189
C     KLUE (31)  =  KMASSB                                              FOP     190
C     KLUE (32)  =  KBALUP                                              FOP     191
C     KLUE (33)  =  KSTRER                                              FOP     192
C     KLUE (34)  =  KRESIZ                                              FOP     193
C     KLUE (35)  =  KNOPT                                               FOP     194
C     KLUE (36)  =  KIDFIX                                              FOP     195
C     KLUE (37)  =  KFREE                                               FOP     196
C                                                                     * FOP     197
C.    KLUE(I)  .....  INTERMEDIATE, (I = LKLUE+1,...,2*LKLUE)         * FOP     198
C     PROGRAM CONTROL WORD OPTION FOR INDICATING WHICH OF THE ANALYSES * FOP     199
C     AND/OR OPTIMIZATIONS HAVE BEEN PERFORMED.                       * FOP     200
C                                                                     * FOP     201
C     VALUES DEFINED WITHIN THE PROGRAM HAVE THE FOLLOWING GENERAL    * FOP     202
C     FUNCTION ..                                                     * FOP     203
C     KLUE(I) = O, THE I'TH ANALYSIS AND/OR OPTIMIZATION HAS NOT BEEN * FOP     204
C                  PERFORMED IN THE CURRENT RUN.                      * FOP     205
C             = I. THE I'TH ANALYSIS AND/OR OPTIMIZATION HAS BEEN     * FOP     206
C                  PERFORMED IN THE CURRENT RUN.                      * FOP     207
C                                                                     * FOP     208
C     WHERE THE SPECIFIC FUNCTION OF EACH VARIABLE IS ASSOCIATED WITH * FOP     209
C     THE SPECIFIC FUNCTION OF THE VARIABLE KLUE(I) FOR               * FOP     210
C     I = 1,....,LKLUE.                                               * FOP     211
C                                                                     * FOP     212
C.... KLUEF(I) .... INPUT (SEE SUBROUTINE FLUTA)                      * FOP     213
C     INPUT DATA CONTROL WORD OPTION FOR PERFORMING FLUTTER ANALYSIS  * FOP     214
C                                                                     * FOP     215
C.... KLUEV(I) ..... INPUT (SEE SUBROUTINE VIBRA)                     * FOP     216
C     INPUT DATA CONTROL WORD OPTION FOR PERFORMING VIBRATION ANALYSIS.* FOP    217
C                                                                     * FOP     218
C.... TMH(I) ....    INTERMEDIATE                                     * FOP     219
C     TITLE CONSISTING OF TWO CARDS FOR LISTING AT THE TOP OF EACH    * FOP     220
C     PAGE OF THE LISTED RESULTS                                      * FOP     221
C                                                                     * FOP     222
C                                                                     * FOP     223
C*********************************************************************** FOP     224
C                                                                       FOP     225
      SUBROUTINE FOP                                                    FOP     226
C                                                                       FOP     227
      INTEGER YES                                                       FOP     228
C                                                                       FOP     229
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CIBM  BEGINNING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS     FOP     230
C     EXTERNAL ERROR                                                    FOP     231
C     DOUBLE PRECISION   ELSTF                                          FOP     232
C     DOUBLE PRECISION DATER ,REELO2                                    FOP     233
C     DOUBLE PRECISION FSIONS,DSIONS                                    FOP     234
CIBM  ENDING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS        FOP     235
C                                                                       FOP     236
      COMPLEX UMOD,VMOD                                                 FOP     237
C                                                                       FOP     238
CCDC  BEGINNING OF STATEMENTS ASSOCIATED WITH CDC COMPUTER PROGRAMS     FOP     239
      INTEGER FET,BUFFER,BUFSZ,OLDU,OLDOP,BUFSZD                        FOP     240
      DIMENSION BUFFER(513,12)    ,BUFSZ(12)                            FOP     241
      DIMENSION FET(54,12)                                              FOP     242
CCDC  ENDING OF STATEMENTS ASSOCIATED WITH CDC COMPUTER PROGRAMS        FOP     243
C                                                                       FOP     244
C                                                                       FOP     245
      DIMENSION DRVMB(20),DRVMBO(20)                                    FOP     246
      DIMENSION EMP(3,3)                                                FOP     247
      DIMENSION FMTA(2)           ,FMTBO(3)                             FOP     248
     1         ,FMTB(3)           ,FMTCO(8)                             FOP     249
     2         ,FSIONS(20)                                              FOP     250
      DIMENSION DSIONS(20)                                              FOP     251
      DIMENSION IDBAL(20)                                               FOP     252
      DIMENSION ITAPES(50)        ,IFILES(50)        ,IPOS(20)          FOP     253
     1         ,ISETUP(45)                                              FOP     254
      DIMENSION JSETUP(25)                                              FOP     255
      DIMENSION KLUE(80)          ,KLUEV(20)         ,KLUEF(20)         FOP     256
      DIMENSION KLUFO(20)                                               FOP     257
      DIMENSION MBDOF(20,3)                                             FOP     258
      DIMENSION NFUF(20,3)        ,NDUF(20,3)                           FOP     259
C                                                                       FOP     260
C  *****************************************************                FOP     261
C  *       THE FOLLOWING LINE OF FASTOP CODE HAS        *               FOP     262
C  *       BEEN COMMENTED OUT BECAUSE IT IS NOT         *               FOP     263
C  *       USED IN THE CURRENT VERSION OF ESP.          *               FOP     264
C  *****************************************************                FOP     265
C     DIMENSION ELSTF(24,24),PATTY(6),NSTART(8),NGO(8)                  FOP     266
C                                                                       FOP     267
      DIMENSION PHP(3,40)                                               FOP     268
      DIMENSION S1MB(20),S2MB(20),S3MB(20)                              FOP     269
      DIMENSION TSHFO(18)         ,TSH(18)           ,TMH(18,2)         FOP     270
     1         ,TSHV(18)          ,TSHF(18)          ,TITLEI(18)        FOP     271
     2         ,TITLE(18,2)                                             FOP     272
      DIMENSION TFH(18)                                                 FOP     273
      DIMENSION UMOD(40), VMOD(40), IDMODE(40)                          FOP     274
      DIMENSION VMBIN(20),VMBNEW(20),VMBOLD(20)                         FOP     275
C                                                                       FOP     276
CCDC  BEGINNING OF STATEMENTS ASSOCIATED WITH CDC COMPUTER PROGRAMS     FOP     277
      COMMON /DCOM1 / MAXUNTS,MAXFILS,OLDU,OLDOP,BUFSZ                  FOP     278
      COMMON /DCOM2 / FET                                               FOP     279
      COMMON /DCOM3 / BUFFER                                            FOP     280
CCDC  ENDING OF STATEMENTS ASSOCIATED WITH CDC COMPUTER PROGRAMS        FOP     281
C                                                                       FOP     282
C                                                                       FOP     283
      COMMON /CTAPES/ ITAPES                                            FOP     284
      COMMON /CLUEM / LKLUE ,KLUE                                       FOP     285
      COMMON /CLUEV / LKLUEV,KLUEV                                      FOP     286
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      COMMON /CLUEF / LKLUEF,KLUEF                                    FOP   287
      COMMON /CTITLE/ LTITLE,TITLE                                    FOP   288
      COMMON /CTMH  / KTMH  ,LTMH  ,TMH                               FOP   289
      COMMON /CTSH  / KTSH  ,LTSH  ,TSH                               FOP   290
      COMMON /MESAG / KMESAG,KTITLE,KTIME ,KTIMEL                     FOP   291
      COMMON /CTFH  / KTFH  ,LTFH  ,TFH                               FOP   292
      COMMON /CTSHV / LTSHV ,TSHV                                     FOP   293
      COMMON /CTSHF / LTSHF ,TSHF                                     FOP   294
      COMMON /CTSHFO/ LTSHFO, TSHFO                                   FOP   295
      COMMON /CFMTA / FMTA                                            FOP   296
      COMMON /CFMTB / FMTB                                            FOP   297
      COMMON /CFMTBO/ FMTBO                                           FOP   298
      COMMON /CFMTCO/ FMTCO                                           FOP   299
      COMMON /CDATER/ DATER                                           FOP   300
      COMMON /CEELO2/ REELO2                                          FOP   301
      COMMON /CLIST / KOUNT ,KPAGE ,LINES ,LINEST,KLABEL,KTPAGE,NPAGE FOP   302
     1               ,KBPAGE,LINESG,KOUNTH,KOUNTI                     FOP   303
      COMMON /CTABLE/ KTABLE,NPASS ,NROWS, NCOLS , NCOLST,KTABLO,NPAGEA FOP 304
     1               ,ITAPET                                          FOP   305
      COMMON /COMRWP/ ITAPER,ITAPEW,ITAPEP                            FOP   306
      COMMON /LABELS/ KFLABO,KDLABO,KFLABI,KDLABI,ITAPEL,KLABEI       FOP   307
      COMMON /CSHIFT/ SHIFT                                           FOP   308
      COMMON /REPORT/ KREPOR                                          FOP   309
      COMMON /CBYTES/ NBYTES                                          FOP   310
      COMMON /CFILES/ KFILES,IFILES                                   FOP   311
      COMMON /MATRIX/ ISETUP                                          FOP   312
      COMMON /FILE  / IPOS  ,NOBUF                                    FOP   313
      COMMON /DSRN  / JSETUP                                          FOP   314
      COMMON /CSETUP/ IOINC                                           FOP   315
      COMMON /CVIBRA/ TOL   ,TOL1  ,TOL2  ,MINUS2                     FOP   316
      COMMON /FSIO1 /LFUF  ,LFUFD ,NFUF                               FOP   317
      COMMON /FSIO2 / FSIONS                                          FOP   318
      COMMON /DSIO1 /LDUF  ,LDUFD ,NDUF                               FOP   319
      COMMON /DSIO2 / DSIONS                                          FOP   320
      COMMON /CONSTS/ NO    ,YES                                      FOP   321
      COMMON /BAL   / NMBAL,IDBAL,VMBIN,VMBOLD,VMBNEW,                FOP   322
     1               MBDOF,DRVMB,DRVMBO,S1MB,S2MB,S3MB                FOP   323
      COMMON /FLUT  / UMOD,VMOD,VF,WW,CSCL,NMODE,IDMODE               FOP   324
      COMMON/PLACES/ IUIN1,IUIN2,IUOUT1,IUOUT2,IUGO1,IUGO2,IUGO3,IUGO4, FOP 325
     1               IUSCR,IFSCR,IFS1,IFS2,IFS3,IFS4,IUCD,IUPR,       FOP   326
     2               IUA,IFA,IUY,IFY,IUMEMN,IFMEMN,IUSTFN,IFSTFN,     FOP   327
     3               IUKS,IFKS,IUB,IFB,IUDESO,IFDESO,                 FOP   328
     4               IUMDBI,IFMDBI,IUADDI,IFADDI,IUBALI,IFBALI,       FOP   329
     5               IUDESI,IFDESI,IUWTI,IFWTI,                       FOP   330
     6               IUMEMO,IFMEMO,IUBT,IFBT,                         FOP   331
     7               IUDESN,IFDESN,IUMD,IFMD,                         FOP   332
     8               IUMEMF,IFMEMF,                                   FOP   333
     9               IUSTFO,IFSTFO,IUMDB,IFMDB,IUADD,IFADD,IUBAL,IFBAL, FOP 334
     A               IUDESF,IFDESF,IUWT,IFWT,                         FOP   335
     B               IUDUM1,IFDUM1,IUDUM2,IFDUM2,IUDUM3,IFDUM3,       FOP   336
     C               IUL,IFL,IUYT,IFYT,IUZ,IFZ,IUZR,IFZR,IULR,IFLR,   FOP   337
     D               IUBR,IFBR,                                       FOP   338
     E               IUPHTF,IFPHTF,IUMODM,IFMODM,                     FOP   339
     F               IUMODK,IFMODK,IUPHT,IFPHT,IUQT,IFQT,IUQ,IFQ,     FOP   340
     G               IUPH,IFPH,IUINCM,IFINCM,IUINCK,IFINCK            FOP   341
      COMMON /PLAYFF/ IUMDFF,IFMDFF,IUDLTI,IFDLTI,IUSLTI,IFSLTI       FOP   342
     1               IUMPLT,IFMPLT,IUTPGT,IFTPGT,IUPATE,IFPATE        FOP   343
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     2                ,IUMPL,IFMPL,IUSLT,IFSLT,IUDLT,IFDLT
     3                ,IUQA,IFQA.IUQAT,IFQAT,IUPHA,IFPHA,IUPHAT,IFPHAT
      COMMON/KLUES/ KLUSE,KLUNAL,IRED,KLUMD,KLUBAL,MSADD,NPAS, IDNOPT,
     1              VDES,EPS1,DWMAX,NBAR,NFIX,D,DEL,EPS2,NCYC,NNN,IBAND,
     2              IFIN,KLUB,KLUQ,MORBAL,DBAL
      COMMON /KLUFF/ KFREE
      COMMON/COLS/ IT,IMINT,IMAXT,IDENS,IOLDT,IOLDW,ISRAT,IMINTO,
     A             IINITT,IWPUT,
     1             NVAR,JWPUT,JINITT,JMINT,JMAXT,JOLDT,JNEWT,JDRV,
     2             JDRVO,JSPR1,JSPR2,JSPR3
      COMMON/SIZES/ NSTMEM,NSTDOF,NDYDOF,NNOPT,NDESNO,NDESYS
C
C *****************************************************
C *       THE FOLLOWING LINE OF FASTOP CODE HAS       *
C *       BEEN COMMENTED OUT BECAUSE IT IS NOT        *
C *       USED IN THE CURRENT VERSION OF ESP.         *
C *****************************************************
C     COMMON /ELMNT/ ELSTF,PATTY,NSTART,NGO
C
      COMMON/BANDW/ IBANDW
      COMMON/WAYTS/ WINITT,WST,WMB,WBOTH,WPRES,DW
      COMMON /CIDIV / IDIV
      COMMON /CORE  / KORE  ,KOREDP
      COMMON /CLUFO/ LKLUFO,KLUFO
      COMMON /PLUG/ EMP,PHP
      COMMON /CPLOTS/ KPLOTS
      COMMON /CPLOTF/ KPLOTF
      COMMON /STORES/ NUMSTR,KCONST,ISTDOF(5,6),IDYDOF(5,6),IDSTR(5)
     A                ,STRWI(5),STRWO(5),STRWN(5),STRII(5,3),STRIO(5,3)
     B                ,STRIN(5,3),STRRI(5,3),STRRO(5,3).STRRN(5,3)
     C                ,STRWDO(5),STRWDN(5),STRIDO(5,3),STRIDN(5,3)
     D                ,STRRDO(5,3),STRRDN(5,3),SCALE(5,7)
      COMMON /STRCLU/ ICYCLE,ISTEP,M1,M2,M3,M4,VS,VOLD,VNEW,STPOLD
      COMMON /LOCSTR/ IUSTRI,IFSTRI,IUMREF,IFMREF
     1                ,IUMOD,IFMOD
      COMMON/RESIZE/ ISIZE,SCLNEW(5,4),SCLOLD(5,4),ITESTO,SAVSTP,IDUB
      COMMON/ACCEL/ ISTOP,IPAR,DWNEW(5),DINEW(5,3),DWOLD(5),DIOLD(5,3)
     1              ,RILSTP
      ICYCLE = 0
      IIII = 0
      M3 = 0
      M4 = 3
      JJJJ = 0
      M5 = 0
      M6 = 0
      M7 = 0
      S1OLD = 0.0
      KCONST = 0
C
C
C PRINT TITLE FOR FLUTTER OPTIMIZATION PACKAGE
C
      CALL TFOP
C
C
C INITIALIZE THE VARIABLES
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      C                                                                 FOP  401
      CIBM  BEGINNING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS FOP  402
      C     LTITLE =  18                                                FOP  403
      C     CALL WORDS (FMTB ,3,12H(18A4)       )                       FOP  404
      C     CALL WORDS (FMTBO,4,16H(10X,18A4)       )                   FOP  405
      C     CALL WORDS (FMTCO,8,32H(10X, 2HJ=,I2,1H,1X,18A4)        )   FOP  406
      C     KOMPUT =  1                                                 FOP  407
      C     TOL    =  1.OE-08                                           FOP  408
      C     TOL1   =  1.OE-03                                           FOP  409
      C     TOL2   =  3.OE-07                                           FOP  410
      C     MINUS2 = -2                                                 FOP  411
      C     IOINC  =  O                                                 FOP  412
      C     NBYTES =  8                                                 FOP  413
      C     KBLAB  =  2                                                 FOP  414
      C     IDIV   =   1                                                FOP  415
      CIBM  ENDING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS  FOP  416
      C                                                                 FOP  417
      C                                                                 FOP  418
      CCDC  BEGINNING OF STATEMENTS ASSOCIATED WITH CDC COMPUTER PROGRAMS FOP  419
            LTITLE =  8                                                 FOP  420
            CALL WORDS (FMTB,3,12H(7A10,1A2)  )                         FOP  421
            CALL WORDS (FMTBO,4,16H(10X,7A10,1A2)  )                    FOP  422
            CALL WORDS (FMTCO,8,32H(10X, 2HJ=,I2,1H,1X,7A10,1A2)    )   FOP  423
            KOMPUT  = 2                                                 FOP  424
            TOL    =  1.OE-13                                           FOP  425
            TOL1   =  1.OE-03                                           FOP  426
            TOL2   =  1.OE-13                                           FOP  427
            DATA MINUS /77777777777777777776B/                          FOP  428
            MINUS2 =  MINUS                                             FOP  429
            IOINC  =  3                                                 FOP  430
            NBYTES =  4                                                 FOP  431
            KBLAB  =  2                                                 FOP  432
            IDIV   =   1                                                FOP  433
      CCDC  ENDING OF STATEMENTS ASSOCIATED WITH CDC COMPUTER PROGRAMS  FOP  434
      C                                                                 FOP  435
            NO     =  1                                                 FOP  436
            YES    =  2                                                 FOP  437
            KPLOTS =  YES                                               FOP  438
            KPLOTV =  NO                                                FOP  439
            KPLOTF =  NO                                                FOP  440
            KLUED  =  80                                                FOP  441
            LKLUE  =  KLUED/2                                           FOP  442
            NKLUE=LKLUE                                                 FOP  443
            KLUEVD =  20                                                FOP  444
            LKLUEV = KLUEVD/2                                           FOP  445
            KLUEFD =  20                                                FOP  446
            LKLUEF = KLUEFD/2                                           FOP  447
            KLESED=30                                                   FOP  448
            LKLESE=KLESED/2                                             FOP  449
            NKLESE=LKLESE                                               FOP  450
            KLUFOD=20                                                   FOP  451
            LKLUFO=KLUFOD/2                                             FOP  452
            IONE   =  1                                                 FOP  453
            NCC    =  10                                                FOP  454
            LTSH   =  18                                                FOP  455
            LTSHV  =  LTSH                                              FOP  456
            LTSHF  =  LTSH                                              FOP  457
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      LTSHFO =  LTSH
      KTFH   =  NO
      LTFH   =  LTSH
      NROWS  =  2
      NCOLS  =  0
      LINESG =  LINES + 1
      KFLABO =  2
      KDLABO =  2
      KFLABI =  1
      KDLABI =  1
      KROUP  = -1
      LTITLI =  18
      CALL DATE(DATER)
      CALL WORDS (FMTA,2,8H(18A4)  )
      KASE   =  0
      MTAPES =  50
      ITAPES(1) =  MTAPES
      MPOS   =  20
      IPOS(1)   = MPOS
      CALL SETUP (2)
      ITAPER =  ITAPES(5)
      ITAPEW =  ITAPES(6)
      ITAPEP =  ITAPES(7)
      IUCD=ITAPER
      IUPR=ITAPEW
      ITAPET  =  ITAPES(19)
      ITAPEL = ITAPES(19)
C
C
C INITIALIZE THE VARIABLES AND LIST DATA
      NCOL   =  80
      KHEAD  =  2
      NTAPEI = 16
      CALL WORDS (SKIP,1,4H20X,)
      KOUNT  =  LINES
      KTABLE =  2
      CALL LDB (NCOL,KHEAD,NTAPEI,ITAPER,ITAPEW,SKIP)
C
C
C READ INPUT DATA
  135 KASE   =  KASE + 1
      CALL IVALUE (KLUE ,IONE,KLUED)
      CALL IVALUE (KLUEV,IONE,KLUEVD)
      CALL IVALUE (KLUEF,IONE,KLUEFD)
      READ (ITAPER,5025) PACAGE, LINESI
      DO 140 I=1,2
      CALL EOFO1 (ITAPER,TMH(1,I),LTMH,KEOF)
      IF (KEOF .EQ. 2) GO TO 1000
  140 CONTINUE
      KOUNT  =  LINES
      KTITLE = 1
      CALL TIMEB (38,38
     1HFROM FOP , AFTER LDB - LIST INPUT DATA)
      KTITLE = 2
      READ (ITAPER,5010) MTITLE
      IF (MTITLE .EQ. 0) GO TO 160
      DO 150 K=1,MTITLE
```

```
      READ (ITAPER,FMTA) (TITLEI(L), L=1,LTITLI)
  150 CONTINUE
  160 CONTINUE
      CALL CLUES (ITAPER,NCC,NKLUE ,KLUE )
  170 CONTINUE
      CALL FSIOFO
      CALL DSIOFO
      KANAV  =  KLUE( 3)
      KANAF  =  KLUE( 4)
      KOPTF  =  KLUE( 7)
      KREPOR =  KLUE( 8)
      KLABEL =  KLUE(9)
      KMESAG =  KLUE(10)
      KTMH   =  KLUE(11)
      KTSH   =  KLUE(12)
      KLABEI =  KLUE(13)
      KTIMEL =  KLUE(14)
      KPASS =KLUE(26)
      KRED  =KLUE(27)
      KMASSA=KLUE(28)
      KMASSD=KLUE(29)
      KMASSO=KLUE(30)
      KMASSB=KLUE(31)
      KBALUP=KLUE(32)
      KSTRER=KLUE(33)
      KRESIZ=KLUE(34)
      KNOPT =KLUE(35)
      KIDFIX=KLUE(36)
      KFREE =KLUE(37)
      LANAV  =  KLUE( 3+LKLUE)
      LANAF  =  KLUE( 4+LKLUE)
C
C
C     CHECK TO SEE THAT VIBRATION & FLUTTER MODULES ARE CALLED
C     IF FLUTTER OPTIMIZATION PACKAGE IS ENTERED.
C
      IF (KOPTF.EQ.2.AND.(KANAV.NE.2.OR.KANAF.NE.2)) GOTO 960
C
C
      NCYC   = 0
      VNEW = 10000.0
      DDD = -1.0
      KLUSE  =  -2
      IF (KANAV .EQ. 2)  KLUSE =-1
      IF (KANAV .EQ. 2   .AND. KANAF .EQ. 2) KLUSE  =0
      IF(KANAV.EQ 2.AND.KANAF.EQ.2.AND.KOPTF.EQ.2) KLUSE=1
      IF(KANAV.EQ.2.AND.KANAF.EQ.2.AND.KOPTF.EQ.2.AND.
     1   KRESIZ.EQ.2) KLUSE=2
      KLUNAL=0
      IF(KSTRER.EQ.2) KLUNAL=1
      IRED   =  KRED - 1
      IF (KMASSA .EQ  1)  KLUMD  = 1
      IF (KMASSA .EQ. 2)  KLUMD  = 0
      KLUBAL =  KMASSB - 1
      MORBAL=KBALUP-1
      IF (KMASSD .EQ. 1) MSADD  =  0
      IF (KMASSD .EQ. 2 .AND. KMASSO .EQ. 1) MSADD = 1
```

```
      IF (KMASSD .EQ. 2 .AND. KMASSO .EQ. 2) MSADD = 2
      NPAS   =  KPASS - 1
      IDNOPT=0
      IF(KNOPT.EQ.2.OR.KIDFIX.EQ.2) IDNOPT=1
  200 CONTINUE
C
C
C INITIALIZE THE TAPES FOR DSIO
C
C
CIBM  BEGINNING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS
C     IF (KANAV.EQ.1) GO TO 215
C     CALL DINIT ( 1,8HFT01F001)
C     CALL DINIT ( 2,8HFT02F001)
C     CALL DINIT ( 3,8HFT03F001)
C     CALL DINIT ( 4,8HFT04F001)
C     CALL DINIT ( 8,8HFT08F001)
C     CALL DINIT (11,8HFT11F001)
C     CALL DINIT (12,8HFT12F001)
C     CALL DINIT ( 9,8HFT09F001)
C     CALL DINIT (10,8HFT10F001)
C 210 CONTINUE
C
C 215 CONTINUE
C
CIBM  ENDING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAM
C
C
CCDC  BEGINNING OF STATEMENTS ASSOCIATED WITH CDC COMPUTER PROGRAMS
      MAXUNTS = 12
      MAXFILS = 40
      MAXLOCS  =  MAXFILS + 14
      BUFSZD = 513
      CALL FETS (FET,MAXLOCS,MAXUNTS)
      DO 133  I=1,MAXUNTS
      BUFSZ(I) =  BUFSZD
      CALL DOPEN (I,1)
  133 CONTINUE
CCDC  ENDING OF STATEMENTS ASSOCIATED WITH CDC COMPUTER PROGRAMS
C
C
C
C
C DEFINE INPUT/OUTPUT UNIT NUMBERS
C
      CALL SETUP (1)
      ITAPO2 =  ITAPES(2)
C
C*****************************************************************
C*****************************************************************
C*****************************************************************
C*****************************************************************
C*****************************************************************
C*****                                                      ******
C*****             AAA   V   V   AAA   M   M                ******
C*****            A   A  V   V  A   A  MM MM                ******
```

```
COMMON BLOCKS   LENGTH     MEMBERS - BIAS NAME(LENGTH)
                                   93 IFPH    (1)          94 IUINCM (1)          95 IFINCM (1)
                                   96 IUINCK  (1)          97 IFINCK (1)
     PLAYFF          26             0 IUMDFF  (1)           1 IFMDFF (1)           2 IUDLTI (1)
                                    3 IFDLTI  (1)           4 IUSLTI (1)           5 IFSLTI (1)
                                    6 IUMPLI  (1)           7 IFMPLI (1)           8 IUTPGT (1)
                                    9 IFTPGT  (1)          10 IUPATF (1)          11 IFPATF (1)
                                   12 IUMPL   (1)          13 IFMPL  (1)          14 IUSLT  (1)
                                   15 IFSLT   (1)          16 IUDLT  (1)          17 IFDLT  (1)
                                   18 IUQA    (1)          19 IFQA   (1)          20 IUQAT  (1)
                                   21 IFQAT   (1)          22 IUPHA  (1)          23 IFPHA  (1)
                                   24 IUPHAT  (1)          25 IFPHAT (1)
     KLUES           24             0 KLUSE   (1)           1 KLUNAL (1)           2 IRED   (1)
                                    3 KLUMD   (1)           4 KLUBAL (1)           5 MSADD  (1)
                                    6 NPAS    (1)           7 IDNOPT (1)           8 VDES   (1)
                                    9 EPS1    (1)          10 DWMAX  (1)          11 NBAR   (1)
                                   12 NFIX    (1)          13 D      (1)          14 DEL    (1)
                                   15 EPS2    (1)          16 NCYC   (1)          17 NNN    (1)
                                   18 IBAND   (1)          19 IFIN   (1)          20 KLUB   (1)
                                   21 KLUQ    (1)          22 MORBAL (1)          23 DBAL   (1)
     KLUFF            1             0 KFREE   (1)
     COLS            22             0 IT      (1)           1 IMINT  (1)           2 IMAXT  (1)
                                    3 IDENS   (1)           4 IOLDT  (1)           5 IOLDW  (1)
                                    6 ISRAT   (1)           7 IMINTO (1)           8 IINITT (1)
                                    9 IWPUT   (1)          10 NVAR   (1)          11 JWPUT  (1)
                                   12 JINITT  (1)          13 JMINT  (1)          14 JMAXT  (1)
                                   15 JOLDT   (1)          16 JNEWT  (1)          17 JDRV   (1)
                                   18 JDRVO   (1)          19 JSPR1  (1)          20 JSPR2  (1)
                                   21 JSPR3   (1)
     SIZES            6             0 NSTMEM  (1)           1 NSTDOF (1)           2 NDYDOF (1)
                                    3 NNOPT   (1)           4 NDESNO (1)           5 NDESYS (1)
     BANDW            1             0 IBANDW  (1)
     WAYTS            6             0 WINITT  (1)           1 WST    (1)           2 WMB    (1)
                                    3 WBOTH   (1)           4 WPRES  (1)           5 DW     (1)
     CIDIV            1             0 IDIV    (1)
     CORE             2             0 KORE    (1)           1 KOREDP (1)
     CLUFO           21             0 LKLUFO  (1)           1 KLUFO  (20)
     PLUG           129             0 EMP     (9)           9 PHP    (120)
     CPLOTS           1             0 KPLOTS  (1)
     CPLOTF           1             0 KPLOTF  (1)
     STORES         277             0 NUMSTR  (1)           1 KCONST (1)           2 ISTDOF (30)
                                   32 IDYDOF  (30)         62 IDSTR  (5)          67 STRWI  (5)
                                   72 STRWO   (5)          77 STRWN  (5)          82 STRII  (15)
                                   97 STRIO   (15)        112 STRIN  (15)        127 STRRI  (15)
                                  142 STRRO   (15)        157 STRRN  (15)        172 STRWDO (5)
                                  177 STRWDN  (5)         182 STRIDO (15)        197 STRIDN (15)
                                  212 STRRDO  (15)        227 STRRDN (15)        242 SCALE  (35)
     STRCLU          10             0 ICYCLE  (1)           1 ISTEP  (1)           2 M1     (1)
                                    3 M2      (1)           4 M3     (1)           5 M4     (1)
                                    6 VS      (1)           7 VOLD   (1)           8 VNEW   (1)
                                    9 STPOLD  (1)
     LOCSTR           6             0 IUSTRI  (1)           1 IFSTRI (1)           2 IUMREF (1)
                                    3 IFMREF  (1)           4 IUMOD  (1)           5 IFMOD  (1)
     RESIZE          44             0 ISIZE   (1)           1 SCLNEW (20)         21 SCLOLD (20)
                                   41 ITESTO  (1)          42 SAVSTP (1)          43 IDUB   (1)
     ACCEL           43             0 ISTOP   (1)           1 IPAR   (1)           2 DWNEW  (5)
                                    7 DINEW   (15)         22 DWOLD  (5)          27 DIOLD  (15)
```

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COMMON BLOCKS    LENGTH     MEMBERS - BIAS NAME(LENGTH)
                                 6 NPAGEA (1)            7 ITAPET (1)
    COMRWP          3            0 ITAPER (1)            1 ITAPEW (1)            2 ITAPEP (1)
    LABELS          6            0 KFLABO (1)            1 KDLABO (1)            2 KFLABI (1)
                                 3 KDLABI (1)            4 ITAPEL (1)            5 KLABEI (1)
    CSHIFT          1            0 SHIFT  (1)
    REPORT          1            0 KREPOR (1)
    CBYTES          1            0 NBYTES (1)
    CFILES         51            0 KFILES (1)            1 IFILES (50)
    MATRIX         45            0 ISETUP (45)
    FILE           21            0 IPOS   (20)          20 NOBUF  (1)
    DSRN           25            0 JSETUP (25)
    CSETUP          1            0 IOINC  (1)
    CVIBRA          4            0 TOL    (1)            1 TOL1   (1)            2 TOL2   (1)
                                 3 MINUS2 (1)
    FSIO1          62            0 LFUF   (1)            1 LFUFD  (1)            2 NFUF   (60)
    FSIO2          20            0 FSIONS (20)
    DSIO1          62            0 LDUF   (1)            1 LDUFD  (1)            2 NDUF   (60)
    DSIO2          20            0 DSIONS (20)
    CONSTS          2            0 NO     (1)            1 YES    (1)
    BAL           241            0 NMBAL  (1)            1 IDBAL  (20)          21 VMBIN  (20)
                                41 VMBOLD (20)          61 VMBNEW (20)          81 MBDOF  (60)
                               141 DRVMB  (20)         161 DRVMBO (20)         181 S1MB   (20)
                               201 S2MB   (20)         221 S3MB   (20)
    FLUT          204            0 UMOD   (80)          80 VMOD   (80)         160 VF     (1)
                               161 WW     (1)          162 CSCL   (1)          163 NMODE  (1)
                               164 IDMODE (40)
    PLACES         98            0 IUIN1  (1)            1 IUIN2  (1)            2 IUOUT1 (1)
                                 3 IUOUT2 (1)            4 IUGO1  (1)            5 IUGO2  (1)
                                 6 IUGO3  (1)            7 IUGO4  (1)            8 IUSCR  (1)
                                 9 IFSCR  (1)           10 IFS1   (1)           11 IFS2   (1)
                                12 IFS3   (1)           13 IFS4   (1)           14 IUCD   (1)
                                15 IUPR   (1)           16 IUA    (1)           17 IFA    (1)
                                18 IUY    (1)           19 IFY    (1)           20 IUMEMN (1)
                                21 IFMEMN (1)           22 IUSTFN (1)           23 IFSTFN (1)
                                24 IUKS   (1)           25 IFKS   (1)           26 IUB    (1)
                                27 IFB    (1)           28 IUDESO (1)           29 IFDESO (1)
                                30 IUMDBI (1)           31 IFMDBI (1)           32 IUADDI (1)
                                33 IFADDI (1)           34 IUBALI (1)           35 IFBALI (1)
                                36 IUDESI (1)           37 IFDESI (1)           38 IUWTI  (1)
                                39 IFWTI  (1)           40 IUMEMO (1)           41 IFMEMO (1)
                                42 IUBT   (1)           43 IFBT   (1)           44 IUDESN (1)
                                45 IFDESN (1)           46 IUMD   (1)           47 IFMD   (1)
                                48 IUMEMF (1)           49 IFMEMF (1)           50 IUSTFO (1)
                                51 IFSTFO (1)           52 IUMDB  (1)           53 IFMDB  (1)
                                54 IUADD  (1)           55 IFADD  (1)           56 IUBAL  (1)
                                57 IFBAL  (1)           58 IUDESF (1)           59 IFDESF (1)
                                60 IUWT   (1)           61 IFWT   (1)           62 IUDUM1 (1)
                                63 IFDUM1 (1)           64 IUDUM2 (1)           65 IFDUM2 (1)
                                66 IUDUM3 (1)           67 IFDUM3 (1)           68 IUL    (1)
                                69 IFL    (1)           70 IUYT   (1)           71 IFYT   (1)
                                72 IUZ    (1)           73 IFZ    (1)           74 IUZR   (1)
                                75 IFZR   (1)           76 IULR   (1)           77 IFLR   (1)
                                78 IUBR   (1)           79 IFBR   (1)           80 IUPHTF (1)
                                81 IFPHTF (1)           82 IUMODM (1)           83 IFMODM (1)
                                84 IUMODK (1)           85 IFMODK (1)           86 IUPHT  (1)
                                87 IFPHT  (1)           88 IUQT   (1)           89 IFQT   (1)
                                90 IUQ    (1)           91 IFQ    (1)           92 IUPH   (1)
```

```
STATEMENT LABELS              DEF LINE   REFERENCES
    0  120        INACTIVE       399
    0  133                       608        605
    0  135        INACTIVE       497
    0  140                       505        502
    0  150                       515        513
  156  160                       516        512
    0  170        INACTIVE       518
    0  200        INACTIVE       575
  347  600                       658        752
  360  700                       695        657        755
  376  725                       710        708
  404  750                       711        709
  405  800                       741        696
  415  850                       763        742
  415  900                       764        665        714        747
  423  960                       779        550
  425  1000                      780        504        778
  602  5010      FMT             784        511
  604  5020      FMT             785        779
  623  5025      FMT             788        501

LOOPS  LABEL     INDEX      FROM-TO     LENGTH     PROPERTIES
  124  140        I         502 505       11B                EXT REFS     EXITS
  146  150        K         513 515       10B                EXT REFS
  334  133        I         605 608        7B                EXT REFS

COMMON BLOCKS    LENGTH     MEMBERS - BIAS NAME(LENGTH)
       DCOM1         16                0 MAXUNTS(1)           1 MAXFILS(1)              2 OLDU    (1)
                                       3 OLDOP  (1)           4 BUFSZ  (12)
       DCOM2        648                0 FET    (648)
       DCOM3       6156                0 BUFFER (6156)
       CTAPES        50                0 ITAPES (50)
       CLUEM         81                0 LKLUE  (1)           1 KLUE   (80)
       CLUEV         21                0 LKLUEV (1)           1 KLUEV  (20)
       CLUEF         21                0 LKLUEF (1)           1 KLUEF  (20)
       CTITLE        37                0 LTITLE (1)           1 TITLE  (36)
       CTMH          38                0 KTMH   (1)           1 LTMH   (1)              2 TMH     (36)
       CTSH          20                0 KTSH   (1)           1 LTSH   (1)              2 TSH     (18)
       MESAG          4                0 KMESAG (1)           1 KTITLE (1)              2 KTIME   (1)
                                       3 KTIMEL (1)
       CTFH          20                0 KTFH   (1)           1 LTFH   (1)              2 TFH     (18)
       CTSHV         19                0 LTSHV  (1)           1 TSHV   (18)
       CTSHF         19                0 LTSHF  (1)           1 TSHF   (18)
       CTSHFO        19                0 LTSHFO (1)           1 TSHFO  (18)
       CFMTA          2                0 FMTA   (2)
       CFMTB          3                0 FMTB   (3)
       CFMTBO         3                0 FMTBO  (3)
       CFMTCO         8                0 FMTCO  (8)
       CDATER         1                0 DATER  (1)
       CEELO2         1                0 REELO2 (1)
       CLIST         11                0 KOUNT  (1)           1 KPAGE  (1)              2 LINES   (1)
                                       3 LINEST (1)           4 KLABEL (1)              5 KTPAGE  (1)
                                       6 NPAGE  (1)           7 KBPAGE (1)              8 LINESG  (1)
                                       9 KOUNTH (1)          10 KOUNTI (1)
       CTABLE         8                0 KTABLE (1)           1 NPASS  (1)              2 NROWS   (1)
                                       3 NCOLS  (1)           4 NCOLST (1)              5 KTABLO  (1)
```

```
VARIABLES      SN  TYPE              RELOCATION
  335  S3MB       REAL        ARRAY    BAL           REFS        268        321
    2  TFH        REAL        ARRAY    CTFH          REFS        272        291
    1  TITLE      REAL        ARRAY    CTITLE        REFS        269        287
  734  TITLEI     REAL        ARRAY                  REFS        269    DEFINED       514
    2  TMH        REAL        ARRAY    CTMH          REFS        269        288       503
    0  TOL        REAL                 CVIBRA        REFS        315    DEFINED       424
    1  TOL1       REAL                 CVIBRA        REFS        315    DEFINED       425
    2  TOL2       REAL                 CVIBRA        REFS        315    DEFINED       426
    2  TSH        REAL        ARRAY    CTSH          REFS        269        289
    1  TSHF       REAL        ARRAY    CTSHF         REFS        269        293
    1  TSHFO      REAL        ARRAY    CTSHFO        REFS        269        294
    1  TSHV       REAL        ARRAY    CTSHV         REFS        269        292
    0  UMOD       COMPLEX     ARRAY    FLUT          REFS        236        273       323
   10  VDES       REAL                 KLUES         REFS        345
  240  VF         REAL                 FLUT          REFS        323
   25  VMBIN      REAL        ARRAY    BAL           REFS        274        321
   75  VMBNEW     REAL        ARRAY    BAL           REFS        274        321
   51  VMBOLD     REAL        ARRAY    BAL           REFS        274        321
  120  VMOD       COMPLEX     ARRAY    FLUT          REFS        236        273       323
   10  VNEW       REAL                 STRCLU        REFS        375    DEFINED       554
    7  VOLD       REAL                 STRCLU        REFS        375
    6  VS         REAL                 STRCLU        REFS        375
    3  WBOTH      REAL                 WAYTS         REFS        363
    0  WINITT     REAL                 WAYTS         REFS        363
    2  WMB        REAL                 WAYTS         REFS        363
    4  WPRES      REAL                 WAYTS         REFS        363
    1  WST        REAL                 WAYTS         REFS        363
  241  WW         REAL                 FLUT          REFS        323
    1  YES        INTEGER              CONSTS        REFS        227        320       437       662       701      2*710
                                                  DEFINED        436
       VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS            TYPE   ARGS       REFERENCES
       AFAM                   1           699
       AFOM                   1           744
       AVAM                   1           660
       CLUES                  4           517
       DATE                   1           469
       DOPEN                  2           607
       DSIOFO                 0           520
       EOFO1                  4           503
       FETS                   3           604
       FLUTAP                 3           701
       FSIOFO                 0           519
       IVALUE                 3           498        499        500
       LDB                    6           493
       LLABEL                 3           770
       LTABLE                 2           775
       PLOT                   3           710
       SETUP                  1           476        616
       TFOP                   0           395
       TIMEB                  2           508
       VIBRAP                 3           662
       WORDS                  3           420        421        422        470        490
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VARIABLES       SN  TYPE            RELOCATION
    4  NDESNO       INTEGER                SIZES      REFS      353
    5  NDESYS       INTEGER                SIZES      REFS      353       752
    2  NDUF         INTEGER      ARRAY     DSIO1      REFS      258       318
    2  NDYDOF       INTEGER                SIZES      REFS      353
   14  NFIX         INTEGER                KLUES      REFS      345       709
    2  NFUF         INTEGER      ARRAY     FSIO1      REFS      258       316
  662  NKLESE    *  INTEGER                        DEFINED      449
  655  NKLUE        INTEGER                           REFS      517    DEFINED      442
    0  NMBAL        INTEGER                BAL        REFS      321
  243  NMODE        INTEGER                FLUT       REFS      323
   21  NNN          INTEGER                KLUES      REFS      345
    3  NNOPT        INTEGER                SIZES      REFS      353
    0  NO           INTEGER                CONSTS     REFS      320       438       439       458    DEFINED      435
   24  NOBUF        INTEGER                FILE       REFS      312
    6  NPAGE        INTEGER                CLIST      REFS      301
    6  NPAGEA       INTEGER                CTABLE     REFS      303
    6  NPAS         INTEGER                KLUES      REFS      345    DEFINED      572
    1  NPASS        INTEGER                CTABLE     REFS      303       664       698    DEFINED      664       698
  732  NPLOTF    *  INTEGER                           REFS      701
  731  NPLOTV    *  INTEGER                           REFS      662
    2  NROWS        INTEGER                CTABLE     REFS      303    DEFINED      460
    1  NSTDOF       INTEGER                SIZES      REFS      353
    0  NSTMEM       INTEGER                SIZES      REFS      353
  675  NTAPEI       INTEGER                           REFS      493    DEFINED      489
    0  NUMSTR       INTEGER                STORES     REFS      370
   12  NVAR         INTEGER                COLS       REFS      349
    3  OLDOP        INTEGER                DCOM1      REFS      239       277
    2  OLDU         INTEGER                DCOM1      REFS      239       277
  677  PACAGE    *  REAL                           DEFINED      501
   11  PHP          REAL         ARRAY     PLUG       REFS      267       367
    0  REELO2       REAL                   CEELO2     REFS      300
   52  RILSTP       REAL                   ACCEL      REFS      379
   52  SAVSTP       REAL                   RESIZE     REFS      378
  362  SCALE        REAL         ARRAY     STORES     REFS      370
    1  SCLNEW       REAL         ARRAY     RESIZE     REFS      378
   25  SCLOLD       REAL         ARRAY     RESIZE     REFS      378
    0  SHIFT        REAL                   CSHIFT     REFS      307
  676  SKIP         REAL                              REFS      490       493
   11  STPOLD       REAL                   STRCLU     REFS      375
  305  STRIDN       REAL         ARRAY     STORES     REFS      370
  266  STRIDO       REAL         ARRAY     STORES     REFS      370
  122  STRII        REAL         ARRAY     STORES     REFS      370
  160  STRIN        REAL         ARRAY     STORES     REFS      370
  141  STRIO        REAL         ARRAY     STORES     REFS      370
  343  STRRDN       REAL         ARRAY     STORES     REFS      370
  324  STRRDO       REAL         ARRAY     STORES     REFS      370
  177  STRRI        REAL         ARRAY     STORES     REFS      370
  235  STRRN        REAL         ARRAY     STORES     REFS      370
  216  STRRO        REAL         ARRAY     STORES     REFS      370
  261  STRWDN       REAL         ARRAY     STORES     REFS      370
  254  STRWDO       REAL         ARRAY     STORES     REFS      370
  103  STRWI        REAL         ARRAY     STORES     REFS      370
  115  STRWN        REAL         ARRAY     STORES     REFS      370
  110  STRWO        REAL         ARRAY     STORES     REFS      370
  265  S1MB         REAL         ARRAY     BAL        REFS      268       321
  650  S1OLD     *  REAL                           DEFINED      389
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VARIABLES      SN  TYPE            RELOCATION
    2  KTIME       INTEGER              MESAG      REFS      290
    3  KTIMEL      INTEGER              MESAG      REFS      290  DEFINED     530
    1  KTITLE      INTEGER              MESAG      REFS      290  DEFINED     507      510
    0  KTMH        INTEGER              CTMH       REFS      288  DEFINED     527
    5  KTPAGE      INTEGER              CLIST      REFS      301
    0  KTSH        INTEGER              CTSH       REFS      289  DEFINED     528
  733  KWIT        INTEGER                         REFS      744     747
  705  L           INTEGER                         REFS      514  DEFINED     514
  725  LANAF     * INTEGER                      DEFINED      544
  724  LANAV     * INTEGER                      DEFINED      543
    0  LDUF        INTEGER              DSIO1      REFS      318
    1  LDUFD       INTEGER              DSIO1      REFS      318
    C  LFUF        INTEGER              FSIO1      REFS      316
    1  LFUFD       INTEGER              FSIO1      REFS      316
    2  LINES       INTEGER              CLIST      REFS      301     462      491      506
   10  LINESG      INTEGER              CLIST      REFS      301  DEFINED     462
  700  LINESI    * INTEGER                      DEFINED      501
    3  LINEST      INTEGER              CLIST      REFS      301
  661  LKLESE      INTEGER                         REFS      449  DEFINED     448
    0  LKLUE       INTEGER              CLUEM      REFS      284     442      543      544  DEFINED     441
    0  LKLUEF      INTEGER              CLUEF      REFS      286  DEFINED     446
    0  LKLUEV      INTEGER              CLUEV      REFS      285  DEFINED     444
    0  LKLUFO      INTEGER              CLUFO      REFS      366  DEFINED     451
    1  LTFH        INTEGER              CTFH       REFS      291  DEFINED     459
    0  LTITLE      INTEGER              CTITLE     REFS      287  DEFINED     419
  667  LTITLI      INTEGER                         REFS      514  DEFINED     468
    1  LTMH        INTEGER              CTMH       REFS      288     503
    1  LTSH        INTEGER              CTSH       REFS      289     455      456      457      459
                                                DEFINED      454
    0  LTSHF       INTEGER              CTSHF      REFS      293  DEFINED     456
    0  LTSHFO      INTEGER              CTSHFO     REFS      294  DEFINED     457
    0  LTSHV       INTEGER              CTSHV      REFS      292  DEFINED     455
    1  MAXFILS     INTEGER              DCOM1      REFS      277     602  DEFINED      601
  727  MAXLOCS     INTEGER                         REFS      604  DEFINED     602
    0  MAXUNTS     INTEGER              DCOM1      REFS      277     604      605  DEFINED      600
  121  MBDOF       INTEGER     ARRAY    BAL        REFS      257     321
  556  MINUS       INTEGER                         REFS      428  DEFINED     427
    3  MINUS2      INTEGER              CVIBRA     REFS      315  DEFINED     428
   26  MORBAL      INTEGER              KLUES      REFS      345  DEFINED     568
  672  MPOS        INTEGER                         REFS      475  DEFINED     474
    5  MSADD       INTEGER              KLUES      REFS      345  DEFINED     569      570      571
  671  MTAPES      INTEGER                         REFS      473  DEFINED     472
  703  MTITLE      INTEGER                         REFS      512     513  DEFINED      511
    2  M1          INTEGER              STRCLU     REFS      375
    3  M2          INTEGER              STRCLU     REFS      375
    4  M3          INTEGER              STRCLU     REFS      375  DEFINED     383
    5  M4          INTEGER              STRCLU     REFS      375  DEFINED     384
  645  M5        * INTEGER                      DEFINED      386
  646  M6        * INTEGER                      DEFINED      387
  647  M7        * INTEGER                      DEFINED      388
   13  NBAR        INTEGER              KLUES      REFS      345
    0  NBYTES      INTEGER              CBYTES     REFS      309  DEFINED     430
  665  NCC         INTEGER                         REFS      517  DEFINED     453
  673  NCOL        INTEGER                         REFS      493  DEFINED     487
    3  NCOLS       INTEGER              CTABLE     REFS      303  DEFINED     461
    4  NCOLST      INTEGER              CTABLE     REFS      303
   20  NCYC        INTEGER              KLUES      REFS      345   2*709  DEFINED      553
```

```
VARIABLES      SN  TYPE              RELOCATION
     1  KCONST     INTEGER                STORES       REFS      370   DEFINED     390
     3  KDLABI     INTEGER                LABELS       REFS      306   DEFINED     466
     1  KDLABO     INTEGER                LABELS       REFS      306   DEFINED     464
   702  KEOF       INTEGER                             REFS      503      504
     O  KFILES     INTEGER                CFILES       REFS      310
     2  KFLABI     INTEGER                LABELS       REFS      306   DEFINED     465
     O  KFLABO     INTEGER                LABELS       REFS      306   DEFINED     463
     O  KFREE      INTEGER                KLUFF        REFS      348   DEFINED     542
   674  KHEAD      INTEGER                             REFS      493   DEFINED     488
   723  KIDFIX     INTEGER                             REFS      574   DEFINED     541
     5  KLABEI     INTEGER                LABELS       REFS      306   DEFINED     529
     4  KLABEL     INTEGER                CLIST        REFS      301   DEFINED     525
   660  KLESED     INTEGER                             REFS      448   DEFINED     447
    24  KLUB       INTEGER                KLUES        REFS      345
     4  KLUBAL     INTEGER                KLUES        REFS      345   DEFINED     567
     1  KLUE       INTEGER     ARRAY      CLUEM        REFS      255      284      498      517      521      522      523
                                                        524      525      526      527      528      529      530      531
                                                        532      533      534      535      536      537      538      539
                                                        540      541      542      543      544      708
   654  KLUED      INTEGER                             REFS      441      498   DEFINED     440
     1  KLUEF      INTEGER     ARRAY      CLUEF        REFS      255      286      500
   657  KLUEFD     INTEGER                             REFS      446      500   DEFINED     445
     1  KLUEV      INTEGER     ARRAY      CLUEV        REFS      255      285      499
   656  KLUEVD     INTEGER                             REFS      444      499   DEFINED     443
     1  KLUFO      INTEGER     ARRAY      CLUFO        REFS      256      366
   663  KLUFOD     INTEGER                             REFS      451   DEFINED     450
     3  KLUMD      INTEGER                KLUES        REFS      345   DEFINED     565      566
     1  KLUNAL     INTEGER                KLUES        REFS      345   DEFINED     562      563
    25  KLUQ       INTEGER                KLUES        REFS      345
     O  KLUSE      INTEGER                KLUES        REFS      345   DEFINED     556      557      558      559      560
   713  KMASSA     INTEGER                             REFS      565      566   DEFINED     533
   716  KMASSB     INTEGER                             REFS      567   DEFINED     536
   714  KMASSD     INTEGER                             REFS      569      570      571   DEFINED     534
   715  KMASSO     INTEGER                             REFS      570      571   DEFINED     535
     O  KMESAG     INTEGER                MESAG        REFS      290   DEFINED     526
   722  KNOPT      INTEGER                             REFS      574   DEFINED     540
   651  KOMPUT   * INTEGER                          DEFINED      423
   710  KOPTF      INTEGER                             REFS      550      559      560      742   DEFINED     523
     O  KORE       INTEGER                CORE         REFS      365
     1  KOREDP     INTEGER                CORE         REFS      365
     O  KOUNT      INTEGER                CLIST        REFS      301   DEFINED     491      506
    11  KOUNTH     INTEGER                CLIST        REFS      301
    12  KOUNTI     INTEGER                CLIST        REFS      301
     1  KPAGE      INTEGER                CLIST        REFS      301
   711  KPASS      INTEGER                             REFS      572   DEFINED     531
     O  KPLOTF     INTEGER                CPLOTF       REFS      369      662      699    2*701      710
                                                    DEFINED      439
     O  KPLOTS     INTEGER                CPLOTS       REFS      368   DEFINED     437
   653  KPLOTV     INTEGER                             REFS      660    2*662      701      710   DEFINED     438
   712  KRED       INTEGER                             REFS      564   DEFINED     532
     O  KREPOR     INTEGER                REPORT       REFS      308   DEFINED     524      765
   721  KRESIZ     INTEGER                             REFS      560   DEFINED     539
   666  KROUP      INTEGER                             REFS      770      775   DEFINED     467
   720  KSTRER     INTEGER                             REFS      563   DEFINED     538
     O  KTABLE     INTEGER                CTABLE       REFS      303   DEFINED     492
     5  KTABLO     INTEGER                CTABLE       REFS      303
     O  KTFH       INTEGER                CTFH         REFS      291   DEFINED     458
```

```
VARIABLES       SN  TYPE           RELOCATION
   24  IUMEMN       INTEGER            PLACES      REFS        324
   50  IUMEMO       INTEGER            PLACES      REFS        324
    4  IUMOD        INTEGER            LOCSTR      REFS        376
  124  IUMODK       INTEGER            PLACES      REFS        324
  122  IUMODM       INTEGER            PLACES      REFS        324
   14  IUMPL        INTEGER            PLAYFF      REFS        341
    6  IUMPLI       INTEGER            PLAYFF      REFS        341
    2  IUMREF       INTEGER            LOCSTR      REFS        376
    2  IUOUT1       INTEGER            PLACES      REFS        324
    3  IUOUT2       INTEGER            PLACES      REFS        324
   12  IUPATF       INTEGER            PLAYFF      REFS        341
  134  IUPH         INTEGER            PLACES      REFS        324
   26  IUPHA        INTEGER            PLAYFF      REFS        341
   30  IUPHAT       INTEGER            PLAYFF      REFS        341
  126  IUPHT        INTEGER            PLACES      REFS        324
  120  IUPHTF       INTEGER            PLACES      REFS        324
   17  IUPR         INTEGER            PLACES      REFS        324   DEFINED     481
  132  IUQ          INTEGER            PLACES      REFS        324
   22  IUQA         INTEGER            PLAYFF      REFS        341
   24  IUQAT        INTEGER            PLAYFF      REFS        341
  130  IUQT         INTEGFR            PLACES      REFS        324
   10  IUSCR        INTEGER            PLACES      REFS        324
   16  IUSLT        INTEGER            PLAYFF      REFS        341
    4  IUSLTI       INTEGER            PLAYFF      REFS        341
   26  IUSTFN       INTEGER            PLACES      REFS        324
   62  IUSTFO       INTEGER            PLACES      REFS        324
    0  IUSTRI       INTEGER            LOCSTR      REFS        376
   10  IUTPGT       INTEGER            PLAYFF      REFS        341
   74  IUWT         INTEGER            PLACES      REFS        324
   46  IUWTI        INTEGER            PLACES      REFS        324
   22  IUY          INTEGER            PLACES      REFS        324
  106  IUYT         INTEGER            PLACES      REFS        324
  110  IUZ          INTEGER            PLACES      REFS        324
  112  IUZR         INTEGER            PLACES      REFS        324
   11  IWPUT        INTEGER            COLS        REFS        349
   21  JDRV         INTEGER            COLS        REFS        349
   22  JDRVO        INTEGER            COLS        REFS        349
   14  JINITT       INTEGER            COLS        REFS        349
  644  JJJJ      *  INTEGER                     DEFINED        385
   16  JMAXT        INTEGER            COLS        REFS        349
   15  JMINT        INTEGER            COLS        REFS        349
   20  JNEWT        INTEGER            COLS        REFS        349
   17  JOLDT        INTEGER            COLS        REFS        349
    0  JSETUP       INTEGER    ARRAY   DSRN        REFS        254      313
   23  JSPR1        INTEGER            COLS        REFS        349
   24  JSPR2        INTEGER            COLS        REFS        349
   25  JSPR3        INTEGER            COLS        REFS        349
   13  JWPUT        INTEGER            COLS        REFS        349
  704  K         *  INTEGER                     DEFINED        513
  707  KANAF        INTEGER                        REFS        550      558         559         560         696
                                                DEFINED        522
  706  KANAV        INTEGER                        REFS        550      557         558         559         560         657
                                                DEFINED        521
  670  KASE         INTEGER                        REFS        497   DEFINED     471         497
  717  KBALUP       INTEGER                        REFS        568   DEFINED     537
  652  KBLAB        INTEGER                        REFS        770   DEFINED     431
    7  KBRACE       INTEGER            CLIST       REFS
```

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VARIABLES     SN  TYPE              RELOCATION
    5  IOLDW      INTEGER                COLS        REFS        349
  664  IONE       INTEGER                            REFS        498       39       500     DEFINED     452
    1  IPAR       INTEGER                ACCEL       REFS        379
    0  IPOS       INTEGER       ARRAY    FILE        REFS        252      312     DEFINED     475
    2  IRED       INTEGER                KLUES       REFS        345   DEFINED      564
    0  ISETUP     INTEGER       ARRAY    MATRIX      REFS        252      311
    0  ISIZE      INTEGER                RESIZE      REFS        378
    6  ISRAT      INTEGER                COLS        REFS        349
    2  ISTDOF     INTEGER       ARRAY    STORES      REFS        370
    1  ISTEP      INTEGER                STRCLU      REFS        375
    0  ISTOP      INTEGER                ACCEL       REFS        379
    0  IT         INTEGER                COLS        REFS        349
    4  ITAPEL     INTEGER                LABELS      REFS        306   DEFINED      483
    2  ITAPEP     INTEGER                COMRWP      REFS        305   DEFINED      479
    0  ITAPER     INTEGER                COMRWP      REFS        305      480       493       503       517
                                                  DEFINED        477   I/O REFS     501       511       514
    0  ITAPES     INTEGER       ARRAY    CTAPES      REFS        252      283       477       478       479       482       483
                                                      617    DEFINED      473
    7  ITAPET     INTEGER                CTABLE      REFS        303   DEFINED      482
    1  ITAPEW     INTEGER                COMRWP      REFS        305      481       493       770       775
                                                  DEFINED        478   I/O REFS     779
  730  ITAPO2   * INTEGER                         DEFINED        617
   51  ITESTO     INTEGER                RESIZE      REFS        378
   20  IUA        INTEGER                PLACES      REFS        324
   66  IUADD      INTEGER                PLACES      REFS        324
   40  IUADDI     INTEGER                PLACES      REFS        324
   32  IUB        INTEGER                PLACES      REFS        324
   70  IUBAL      INTEGER                PLACES      REFS        324
   42  IUBALI     INTEGER                PLACES      REFS        324
  116  IUBR       INTEGER                PLACES      REFS        324
   52  IUBT       INTEGER                PLACES      REFS        324
   16  IUCD       INTEGER                PLACES      REFS        324   DEFINED      480
   72  IUDESF     INTEGER                PLACES      REFS        324
   44  IUDESI     INTEGER                PLACES      REFS        324
   54  IUDESN     INTEGER                PLACES      REFS        324
   34  IUDESO     INTEGER                PLACES      REFS        324
   20  IUDLT      INTEGER                PLAYFF      REFS        341
    2  IUDLTI     INTEGER                PLAYFF      REFS        341
   76  IUDUM1     INTEGER                PLACES      REFS        324
  100  IUDUM2     INTEGER                PLACES      REFS        324
  102  IUDUM3     INTEGER                PLACES      REFS        324
    4  IUGO1      INTEGER                PLACES      REFS        324
    5  IUGO2      INTEGER                PLACES      REFS        324
    6  IUGO3      INTEGER                PLACES      REFS        324
    7  IUGO4      INTEGER                PLACES      REFS        324
  140  IUINCK     INTEGER                PLACES      REFS        324
  136  IUINCM     INTEGER                PLACES      REFS        324
    0  IUIN1      INTEGER                PLACES      REFS        324
    1  IUIN2      INTEGER                PLACES      REFS        324
   30  IUKS       INTEGER                PLACES      REFS        324
  104  IUL        INTEGER                PLACES      REFS        324
  114  IULR       INTEGER                PLACES      REFS        324
   56  IUMD       INTEGER                PLACES      REFS        324
   64  IUMDB      INTEGER                PLACES      REFS        324
   36  IUMDBI     INTEGER                PLACES      REFS        324
    0  IUMDFF     INTEGER                PLAYFF      REFS        341
   60  IUMEME     INTEGER                PLACES      REFS        324
```

```
VARIABLES      SN  TYPE              RELOCATION
   77  IFDUM1      INTEGER                PLACES       REFS        324
  101  IFDUM2      INTEGER                PLACES       REFS        324
  103  IFDUM3      INTEGER                PLACES       REFS        324
    1  IFILES      INTEGER      ARRAY     CFILES       REFS        252        310
   23  IFIN        INTEGER                KLUES        REFS        345        665        714
  141  IFINCK      INTEGER                PLACES       REFS        324
  137  IFINCM      INTEGER                PLACES       REFS        324
   31  IFKS        INTEGER                PLACES       REFS        324
  105  IFL         INTEGER                PLACES       REFS        324
  115  IFLR        INTEGER                PLACES       REFS        324
   57  IFMC        INTEGER                PLACES       REFS        324
   65  IFMDB       INTEGER                PLACES       REFS        324
   37  IFMDBI      INTEGER                PLACES       REFS        324
    1  IFMDFF      INTEGER                PLAYFF       REFS        341
   61  IFMEMF      INTEGER                PLACES       REFS        324
   25  IFMEMN      INTEGER                PLACES       REFS        324
   51  IFMEMO      INTEGER                PLACES       REFS        324
    5  IFMOD       INTEGER                LOCSTR       REFS        376
  125  IFMODK      INTEGER                PLACES       REFS        324
  123  IFMODM      INTEGER                PLACES       REFS        324
   15  IFMPL       INTEGER                PLAYFF       REFS        341
    7  IFMPLI      INTEGER                PLAYFF       REFS        341
    3  IFMREF      INTEGER                LOCSTR       REFS        376
   13  IFPATF      INTEGER                PLAYFF       REFS        341
  135  IFPH        INTEGER                PLACES       REFS        324
   27  IFPHA       INTEGER                PLAYFF       REFS        341
   31  IFPHAT      INTEGER                PLAYFF       REFS        341
  127  IFPHT       INTEGER                PLACES       REFS        324
  121  IFPHTF      INTEGER                PLACES       REFS        324
  133  IFQ         INTEGER                PLACES       REFS        324
   23  IFQA        INTEGER                PLAYFF       REFS        341
   25  IFQAT       INTEGER                PLAYFF       REFS        341
  131  IFQT        INTEGER                PLACES       REFS        324
   11  IFSCR       INTEGER                PLACES       REFS        324
   17  IFSLT       INTEGER                PLAYFF       REFS        341
    5  IFSLTI      INTEGER                PLAYFF       REFS        341
   27  IFSTFN      INTEGER                PLACES       REFS        324
   63  IFSTFO      INTEGER                PLACES       REFS        324
    1  IFSTRI      INTEGER                LOCSTR       REFS        376
   12  IFS1        INTEGER                PLACES       REFS        324
   13  IFS2        INTEGER                PLACES       REFS        324
   14  IFS3        INTEGER                PLACES       REFS        324
   15  IFS4        INTEGER                PLACES       REFS        324
   11  IFTPGT      INTEGER                PLAYFF       REFS        341
   75  IFWT        INTEGER                PLACES       REFS        324
   47  IFWTI       INTEGER                PLACES       REFS        324
   23  IFY         INTEGER                PLACES       REFS        324
  107  IFYT        INTEGER                PLACES       REFS        324
  111  IFZ         INTEGER                PLACES       REFS        324
  113  IFZR        INTEGER                PLACES       REFS        324
  643  IIII     *  INTEGER                          DEFINED        382
   10  IINITT      INTEGER                COLS         REFS        349
    2  IMAXT       INTEGER                COLS         REFS        349
    1  IMINT       INTEGER                COLS         REFS        349
    7  IMINTO      INTEGER                COLS         REFS        349
    0  IOINC       INTEGER                CSETUP       REFS        314    DEFINED        429
    4  IOLDT       INTEGER                COLS         REFS        349
```

```
ENTRY POINTS     DEF LINE     REFERENCES
    1  FOP          225          790

VARIABLES       SN  TYPE              RELOCATION
    0  BUFFER       INTEGER    ARRAY   DCOM3        REFS          239      240      279
    4  BUFSZ        INTEGER    ARRAY   DCOM1        REFS          239      240      277    DEFINED     606
  642  BUFSZD       INTEGER                         REFS          239      606    DEFINED     603
  242  CSCL         REAL               FLUT         REFS          323
   15  D            REAL               KLUES        REFS          345
    0  DATER        REAL               CDATER       REFS          299      469
   27  DBAL         REAL               KLUES        REFS          345
  726  DDD        * REAL                         DEFINED          555
   16  DEL          REAL               KLUES        REFS          345
    7  DINEW        REAL       ARRAY   ACCEL        REFS          379
   33  DIOLD        REAL       ARRAY   ACCEL        REFS          379
  215  DRVMB        REAL       ARRAY   BAL          REFS          245      321
  241  DRVMBO       REAL       ARRAY   BAL          REFS          245      321
    0  DSIONS       REAL       ARRAY   DSIO2        REFS          250      319
    5  DW           REAL               WAYTS        REFS          363
   12  DWMAX        REAL               KLUES        REFS          345
    2  DWNEW        REAL       ARRAY   ACCEL        REFS          379
   26  DWOLD        REAL       ARRAY   ACCEL        REFS          379
    0  EMP          REAL       ARRAY   PLUG         REFS          246      367
   11  EPS1         REAL               KLUES        REFS          345
   17  EPS2         REAL               KLUES        REFS          345
    0  FET          INTEGER    ARRAY   DCOM2        REFS          239      241      278      604
    0  FMTA         REAL       ARRAY   CFMTA        REFS          247      295      470      514
    0  FMTB         REAL       ARRAY   CFMTB        REFS          247      296      420
    0  FMTBO        REAL       ARRAY   CFMTBO       REFS          247      297      421
    0  FMTCO        REAL       ARRAY   CFMTCO       REFS          247      298      422
    0  FSIONS       REAL       ARRAY   FSIO2        REFS          247      317
  701  I            INTEGER                         REFS          503      606      607    DEFINED     502      605
   22  IBAND        INTEGER            KLUES        REFS          345
    0  IBANDW       INTEGER            BANDW        REFS          362
    0  ICYCLE       INTEGER            STRCLU       REFS          375    DEFINED     381
    1  IDBAL        INTEGER    ARRAY   BAL          REFS          251      321
    3  IDENS        INTEGER            COLS         REFS          349
    0  IDIV         INTEGER            CIDIV        REFS          364    DEFINED     432
  244  IDMODE       INTEGER    ARRAY   FLUT         REFS          273      323
    7  IDNOPT       INTEGER            KLUES        REFS          345    DEFINED     573      574
   76  IDSTR        INTEGER    ARRAY   STORES       REFS          370
   53  IDUB         INTEGER            RESIZE       REFS          378
   40  IDYDOF       INTEGER    ARRAY   STORES       REFS          370
   21  IFA          INTEGER            PLACES       REFS          324
   67  IFADD        INTEGER            PLACES       REFS          324
   41  IFADDI       INTEGER            PLACES       REFS          324
   33  IFB          INTEGER            PLACES       REFS          324
   71  IFBAL        INTEGER            PLACES       REFS          324
   43  IFBALI       INTEGER            PLACES       REFS          324
  117  IFBR         INTEGER            PLACES       REFS          324
   53  IFBT         INTEGER            PLACES       REFS          324
   73  IFDESF       INTEGER            PLACES       REFS          324
   45  IFDESI       INTEGER            PLACES       REFS          324
   55  IFDESN       INTEGER            PLACES       REFS          324
   35  IFDESO       INTEGER            PLACES       REFS          324
   21  IFDLT        INTEGER            PLAYFF       REFS          341
    3  IFDLTI       INTEGER            PLAYFF       REFS          341
```

```
      IF (KOPTF .EQ. 1) GO TO 850                                       FOP  743
C                                                                       FOP  744
      CALL AFOM (KWIT)                                                  FOP  745
C                                                                       FOP  746
C                                                                       FOP  747
      IF(KWIT.EQ.1) GO TO 900                                           FOP  748
C                                                                       FOP  749
C THE MODAL MASS(MODM) AND THE MODAL STIFFNESS(MODK) HAVE BEEN UPDATED  FOP  750
C FOR THE NEW DESIGN. CALL FLUTTER PACKAGE FOR NEW FLUTTER ANALYSIS.    FOP  751
C                                                                       FOP  752
      IF(NDESYS.EQ.0) GO TO 600                                         FOP  753
C                                                                       FOP  754
C                                                                       FOP  755
      GO TO 700                                                         FOP  756
C                                                                       FOP  757
C*********************************************************************** FOP  758
C*********************************************************************** FOP  759
C*********************************************************************** FOP  760
C*********************************************************************** FOP  761
C*********************************************************************** FOP  762
C                                                                       FOP  763
  850 CONTINUE                                                          FOP  764
  900 CONTINUE                                                          FOP  765
      KREPOR =  2                                                       FOP  766
C                                                                       FOP  767
C                                                                       FOP  768
C LIST INPUT-OUTPUT LABELS                                              FOP  769
C                                                                       FOP  770
      CALL LLABEL (ITAPEW,KROUP,KBLAB)                                  FOP  771
C                                                                       FOP  772
C                                                                       FOP  773
C LIST T'BLE OF CONTENTS                                                FOP  774
C                                                                       FOP  775
      CA   LTABLE (ITAPEW,KROUP)                                        FOP  776
C                                                                       FOP  777
C     GO TO 135                                                         FOP  778
      GOTO 1000                                                         FOP  779
  960 WRITE (ITAPEW,5020)                                               FOP  780
 1000 CONTINUE                                                          FOP  781
C                                                                       FOP  782
C                                                                       FOP  783
C FORMATS                                                               FOP  784
 5010 FORMAT (10I4 )                                                    FOP  785
 5020 FORMAT (20X,27H********** ERROR **********, //,                   FOP  786
     1        20X65HVIBRATION & FLUTTER PACKAGES MUST BE CALLED PRIOR TO FOP  787
     2 OPTIMIZATION, //, 20X20HEXECUTION TERMINATED)                    FOP  788
 5025 FORMAT (1A4, 10I4)                                                FOP  789
C                                                                       FOP  790
      RETURN                                                            FOP  791
      END                                                               FOP  792
```

SYMBOLIC REFERENCE MAP (R=3)

```
      C                                                                  FOP     686
      C AUTOMATED FLUTTER ANALYSIS MODULE                                FOP     687
      C                                                                  FOP     688
      C                                                                  FOP     689
      C CALL FLUTTER PACKAGE.                                            FOP     690
      C    1. COMPUTE FLUTTER SPEED,VF, AND FLUTTER FREQ.(SQ),WW.        FOP     691
      C    2. IF KLUSE=1 OR 2 ALSO COMPUTE MODAL VECTORS, UMOD AND VMOD, FOP     692
      C       AND THE AERO DERIVATIVE SCALAR, CSCL.                      FOP     693
      C                                                                  FOP     694
      C                                                                  FOP     695
        700 CONTINUE                                                     FOP     696
            IF (KANAF .EQ. 1) GOTO 800                                   FOP     697
      C                                                                  FOP     698
            NPASS  =  NPASS + 1                                          FOP     699
            CALL AFAM (KPLOTF)                                           FOP     700
      C                                                                  FOP     701
            IF (KPLOTF .EQ. YES)  CALL FLUTAP (KPLOTV,KPLOTF,NPLOTF)     FOP     702
      C                                                                  FOP     703
      CIBM                                                               FOP     704
      C     IF (KPLOTF.EQ.YES.OR.KPLOTV.EQ.YES)  CALL PLOT(0.,0.,999)    FOP     705
      CIBM                                                               FOP     706
      C                                                                  FOP     707
      CCDC                                                               FOP     708
            IF (KLUE(7).EQ.1)  GO TO 725                                 FOP     709
            IF (NCYC.EQ.0.OR.NCYC.LT.NFIX)  GO TO 750                    FOP     710
        725 IF (KPLOTF.EQ.YES.OR.KPLOTV.EQ.YES)  CALL PLOT(0.,0.,999)    FOP     711
        750 CONTINUE                                                     FOP     712
      CCDC                                                               FOP     713
      C                                                                  FOP     714
            IF(IFIN.EQ.0) GO TO 900                                      FOP     715
      C                                                                  FOP     716
      C*********************************************************************** FOP     717
      C*********************************************************************** FOP     718
      C*********************************************************************** FOP     719
      C*********************************************************************** FOP     720
      C*********************************************************************** FOP     721
      C*****                                                          ****** FOP     722
      C*****                AAA    FFFFF    OOO    M   M              ****** FOP     723
      C*****               A   A   F       O   O   MM MM              ****** FOP     724
      C*****               AAAAA - FFFF  - O   O - M M M              ****** FOP     725
      C*****               A   A   F       O   O   M M M              ****** FOP     726
      C*****               A   A   F        OOO    M M M              ****** FOP     727
      C*****                                                          ****** FOP     728
      C*********************************************************************** FOP     729
      C*********************************************************************** FOP     730
      C*********************************************************************** FOP     731
      C*********************************************************************** FOP     732
      C*********************************************************************** FOP     733
      C                                                                  FOP     734
      C                                                                  FOP     735
      C AUTOMATED FLUTTER OPTIMIZATION MODULE                            FOP     736
      C                                                                  FOP     737
      C                                                                  FOP     738
      C CALL SUBROUTINE AFOM  TO COMPUTE FLUTTER DERIVATIVES, REDESIGN THE  FOP     739
      C STRUCTURE, ETC.                                                  FOP     740
      C                                                                  FOP     741
        800 CONTINUE                                                     FOP     742
```

```
C*****                 A   A   V V   A   A   M M M                ****** FOP
C*****                 A   A    V    A   A   M M M                ****** FOP
C*****                                                            ****** FOP
C************************************************************************ FOP
C************************************************************************ FOP
C************************************************************************ FOP
C************************************************************************ FOP
C************************************************************************ FOP
C                                                                        FOP
C                                                                        FOP
C AUTOMATED VIBRATION ANALYSIS MODULE                                    FOP
C                                                                        FOP
C CALL THE VIBRATION PACKAGE.  FIVE UNITS ARE AVAILABLE.                 FOP
C                                                                        FOP
C  A. UNIT IUIN1(TAPE) CONTAINS A (OR KS,IF IRED=0) AS FIRST FILE.       FOP
C     IF NEEDED, SCRATCH FILE IFSCR IS AVAILABLE.                        FOP
C  B. UNIT IUGO2 CONTAINS MD AS FILE IFS2. WHEN MD IS NO LONGER NEEDED,  FOP
C     THIS FILE CAN BE USED AS SCRATCH SPACE.                            FOP
C  C. UNITS IUGO1,IUGO3 AND IUGO4 HAVE SCRATCH SPACE ON FILES IFS1, IFS3 FOP
C     AND IFS4, RESPECTIVELY.                                            FOP
C                                                                        FOP
C OUTPUT- MODAL MATRIX PHTF OCCUPIES FILE IFS4 ON UNIT IUGO4.            FOP
C         MODAL MASS,MODM, IS PUT ON FILE IFS1 OF UNIT IUGO1. THIS IS    FOP
C         FOLLOWED BY FILE FOR MODAL STIFFNESS, MODK.                    FOP
C         IN ADDITION, ONE FORTRAN FILE IS PROVIDED FOR THE FLUTTER      FOP
C         PROGRAM. THIS FILE CONTAINS FREQUENCIES, MODAL MASS AND THE    FOP
C         REDUCED MODAL MATRIX.                                          FOP
C                                                                        FOP
C                                                                        FOP
      IF (KANAV .EQ. 1) GOTO 700                                         FOP
  600 CONTINUE                                                           F P
C                                                                        FOP
      CALL AVAM (KPLOTV)                                                 FOP
C                                                                        FOP
      IF(KPLOTV.EQ.YES) CALL VIBRAP(KPLOTV,KPLOTF,NPLOTV)                FOP
C                                                                        FOP
      NPASS  =  NPASS - 1                                                FOP
      IF(IFIN.EQ.-1) GO TO 900                                           FOP
C                                                                        FOP
C************************************************************************ FOP
C************************************************************************ FOP
C************************************************************************ FOP
C************************************************************************ FOP
C************************************************************************ FOP
C*****                                                            ****** FOP
C*****                  AAA     FFFFF    AAA     M   M            ****** FOP
C*****                 A   A    F       A   A    MM MM            ****** FOP
C*****                 AAAAA -  FFFF  - AAAAA    M M M            ****** FOP
C*****                 A   A    F       A   A    M M M            ****** FOP
C*****                 A   A    F       A   A    M M M            ****** FOP
C*****                                                            ****** FOP
C************************************************************************ FOP
C************************************************************************ FOP
C************************************************************************ FOP
C************************************************************************ FOP
C************************************************************************ FOP
C                                                                        FOP
```

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STATISTICS
  PROGRAM LENGTH              1002B      514
  CM LABELED COMMON LENGTH   20767B     8695
          52000B CM USED
```

```
      C                                                                         TFOP     2
      C45700. SUB. TFOP(TITLE FOR FLUTTER OPTIMIZATION PACKAGE)                 TFOP     3
      C                                                                         TFOP     4
      C************************************************************************ TFOP     5
      C                                                                       * TFOP     6
      C***  SUBROUTINE TFOP   ************************************************* TFOP     7
      C                                                                       * TFOP     8
      C***  OBJECTIVE  ******************************************************** TFOP     9
      C     ---------                                                         * TFOP    10
      C     PRINTS THE TITLE PAGE FOR THE FLUTTER    OPTIMIZATION PACKAGE     * TFOP    11
      C                                                                       * TFOP    12
      C************************************************************************ TFOP    13
      C                                                                         TFOP    14
            SUBROUTINE TFOP                                                     TFOP    15
      C                                                                         TFOP    16
            DIMENSION AFFDL(4)                                                  TFOP    17
      C                                                                         TFOP    18
            COMMON /COMRWP/ ITAPER,ITAPEW,ITAPEP                                TFOP    19
            COMMON /CLIST / KOUNT ,KPAGE ,LINES ,LINEST,KLABEL,KTPAGE,NPAGE     TFOP    20
           1               ,KBPAGE,LINESG,KOUNTH,KOUNTI                         TFOP    21
            COMMON /CTABLE/ KTABLE,NPASS ,NROWS ,NCOLS ,NCOLST,KTABLO,NPAGEA    TFOP    22
           1               ,ITAPET                                              TFOP    23
            COMMON /CAFFDL/ AFFDL                                               TFOP    24
      C                                                                         TFOP    25
      C                                                                         TFOP    26
      C PREPARE TABLE OF CONTENTS                                               TFOP    27
      C                                                                         TFOP    28
            KOUNT  =  LINES                                                     TFOP    29
            CALL TITLES (-1)                                                    TFOP    30
            NCOLS  =  0                                                         TFOP    31
            NROWS  =  2                                                         TFOP    32
            KTABLE =  2                                                         TFOP    33
            CALL PTABLE (1,60,60                                                TFOP    34
           *   H*****     ***     ****                                    )     TFOP    35
            NROWS  =  0                                                         TFOP    36
            KTABLE =  2                                                         TFOP    37
            CALL PTABLE (1,60,60                                                TFOP    38
           *   H*         *    *    *    *                                )     TFOP    39
            KTABLE =  2                                                         TFOP    40
            CALL PTABLE (1,60,60                                                TFOP    41
           *   H****  - *     * - ****                 FLUTTER            )     TFOP    42
            KTABLE =  2                                                         TFOP    43
            CALL PTABLE (1,60,60                                                TFOP    44
           *   H*         *    *    *                OPTIMIZATION         )     TFOP    45
            KTABLE =  2                                                         TFOP    46
            CALL PTABLE (2,60,60                                                TFOP    47
           *   H*         ***     *                    PACKAGE            )     TFOP    48
            KOUNT  =  LINES                                                     TFOP    49
      C                                                                         TFOP    50
      C                                                                         TFOP    51
      C LIST TITLE PAGE                                                         TFOP    52
      C                                                                         TFOP    53
            WRITE (ITAPEW,100)                                                  TFOP    54
            WRITE (ITAPEW,105)                                                  TFOP    55
            WRITE (ITAPEW,110)                                                  TFOP    56
            WRITE (ITAPEW,115) AFFDL                                            TFOP    57
            WRITE (ITAPEW,120)                                                  TFOP    58
```

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      WRITE (ITAPEW,125)                                                 TFOP     59
      WRITE (ITAPEW,130)                                                 TFOP     60
      WRITE (ITAPEW,135)                                                 TFOP     61
      WRITE (ITAPEW,140)                                                 TFOP     62
      WRITE (ITAPEW,145)                                                 TFOP     63
      WRITE (ITAPEW,150)                                                 TFOP     64
      WRITE (ITAPEW,155)                                                 TFOP     65
      WRITE (ITAPEW,160)                                                 TFOP     66
      WRITE (ITAPEW,165)                                                 TFOP     67
      WRITE (ITAPEW,170)                                                 TFOP     68
      WRITE (ITAPEW,175)                                                 TFOP     69
  100 FORMAT (                                                           TFOP     70
     *    5X,122(1H*)                                                    TFOP     71
     *,/, 5X,1H*,120X,1H*                                                TFOP     72
     *,/, 5X,1H*,15X                                                     TFOP     73
     F,13HFFFFFFFFFFFFF                                                  TFOP     74
     *,52X, 36H.....................................,4X,1H*              TFOP     75
     *,/, 5X,1H*,15X                                                     TFOP     76
     F,13HFFFFFFFFFFFFF                                                  TFOP     77
     *,52X, 36H.                                   .,4X,1H*              TFOP     78
     *,/, 5X,1H*,15X                                                     TFOP     79
     F,13H FFF     FFF                                                   TFOP     80
     *,52X, 36H.        **** FASTOP ****           .,4X,1H*              TFOP     81
     *,/, 5X,1H*,15X                                                     TFOP     82
     F,13H FFF     FFF                                                   TFOP     83
     *,52X, 36H.     FLUTTER AND STRUCTURAL        .,4X,1H*              TFOP     84
     *,/, 5X,1H*,15X                                                     TFOP     85
     F,13H FFF                                                           TFOP     86
     *,52X, 36H.      OPTIMIZATION PROGRAM         .,4X,1H*)             TFOP     87
  105 FORMAT (                                                           TFOP     88
     *    5X,1H*,15X                                                     TFOP     89
     F,13H FFF                                                           TFOP     90
     *,52X, 36H.                                   .,4X,1H*              TFOP     91
     *,/, 5X,1H*,15X                                                     TFOP     92
     F,13H FFF                                                           TFOP     93
     *,52X, 36H.         **** FOP ****             .,4X,1H*              TFOP     94
     *,/, 5X,1H*,15X                                                     TFOP     95
     F,13H FFF                                                           TFOP     96
     *,52X, 36H.   FLUTTER OPTIMIZATION PACKAGE    .,4X,1H*              TFOP     97
     *,/, 5X,1H*,15X                                                     TFOP     98
     F,13H FFF                                                           TFOP     99
     *,52X, 36H.                                   .,4X,1H*              TFOP    100
     *,/, 5X,1H*,15X                                                     TFOP    101
     F,13H FFFFFFFFF                                                     TFOP    102
     *,52X, 36H.....................................,4X,1H*)             TFOP    103
  110 FORMAT (                                                           TFOP    104
     *    5X,1H*,15X                                                     TFOP    105
     F,13H FFFFFFFFF                                                     TFOP    106
     *,26X                                                               TFOP    107
     *,26X, 36H.                                   .,4X,1H*              TFOP    108
     *,/, 5X,1H*,15X                                                     TFOP    109
     F,13H FFF                                                           TFOP    110
     *,26X                                                               TFOP    111
     *,26X, 36H.           AIR FORCE               .,4X,1H*              TFOP    112
     *,/, 5X,1H*,15X                                                     TFOP    113
     F,13H FFF                                                           TFOP    114
     *,26X                                                               TFOP    115
```

```
          *,26X, 36H     FLIGHT DYNAMICS LABORATORY    .,4X,1H*)        TFOP     116
       115 FORMAT (                                                     TFOP     117
          *     5X,1H*,15X                                              TFOP     118
          F,13H FFF                                                     TFOP     119
          *,52X, 36H.                                  .,4X,1H*         TFOP     120
          *,/, 5X,1H*,15X                                               TFOP     121
          F,13H FFF                                                     TFOP     122
          *,52X, 10H.          ,4A4, 10H          .,4X,1H*              TFOP     123
          *,/, 5X,1H*,15X                                               TFOP     124
          F,13H FFF                                                     TFOP     125
          *,26X                                                         TFOP     126
          0,13H   0000000                                               TFOP     127
          *,13X, 36H.                                  .,4X,1H*)        TFOP     128
       120 FORMAT (                                                     TFOP     129
          *     5X,1H*,15X                                              TFOP     130
          F,13H FFF                                                     TFOP     131
          *,26X                                                         TFOP     132
          0,13H  000000000                                              TFOP     133
          *,13X, 36H...................................,4X,1H*         TFOP     134
          *,/, 5X,1H*,15X                                               TFOP     135
          F,13H FFF                                                     TFOP     136
          *,26X                                                         TFOP     137
          0,13H 0000    0000                                            TFOP     138
          *,53X,1H*                                                     TFOP     139
          *,/, 5X,1H*,15X                                               TFOP     140
          F,13HFFFF                                                     TFOP     141
          *,26X                                                         TFOP     142
          0,13H000        000                                           TFOP     143
          *,53X,1H*)                                                    TFOP     144
       125 FORMAT (                                                     TFOP     145
          *     5X,1H*,15X                                              TFOP     146
          F,13HFFFF                                                     TFOP     147
          *,26X                                                         TFOP     148
          0,13H000        000                                           TFOP     149
          *,53X,1H*                                                     TFOP     150
          *,/, 5X,1H*,54X                                               TFOP     151
          0,13H000        000                                           TFOP     152
          *,53X,1H*                                                     TFOP     153
          *,/, 5X,1H*,54X                                               TFOP     154
          0,13H000        000                                           TFOP     155
          *,53X,1H*)                                                    TFOP     156
       130 FORMAT (                                                     TFOP     157
          *     5X,1H*,54X                                              TFOP     158
          0,13H000        000                                           TFOP     159
          *,53X,1H*                                                     TFOP     160
          *,/, 5X,1H*,54X                                               TFOP     161
          0,13H000        000                                           TFOP     162
          *,53X,1H*                                                     TFOP     163
          *,/, 5X,1H*,54X                                               TFOP     164
          0,13H000        000                                           TFOP     165
          *,53X,1H*)                                                    TFOP     166
       135 FORMAT (                                                     TFOP     167
          *     5X,1H*,54X                                              TFOP     168
          0,13H000        000                                           TFOP     169
          *,53X,1H*                                                     TFOP     170
          *,/, 5X,1H*,54X                                               TFOP     171
```

```
      *,53X,1H*                                                         TFOP  173
      *,/, 5X,1H*,54X                                                   TFOP  174
      0,13H000        000                                               TFOP  175
      *,53X,1H*)                                                        TFOP  176
  140 FORMAT (                                                          TFOP  177
      *    5X,1H*,54X                                                   TFOP  178
      0,13H000        000                                               TFOP  179
      *,53X,1H*                                                         TFOP  180
      *,/, 5X,1H*,54X                                                   TFOP  181
      0,13H000        000                                               TFOP  182
      *,53X,1H*                                                         TFOP  183
      *,/, 5X,1H*,54X                                                   TFOP  184
      0,13H000        000                                               TFOP  185
      *,26X                                                             TFOP  186
      P,13HPPPPPPPPPPP                                                  TFOP  187
      *,14X,1H*)                                                        TFOP  188
  145 FORMAT (                                                          TFOP  189
      *    5X,1H*,54X                                                   TFOP  190
      0,13H000        000                                               TFOP  191
      *,26X                                                             TFOP  192
      P,13HPPPPPPPPPPPP                                                 TFOP  193
      *,14X,1H*                                                         TFOP  194
      *,/, 5X,1H*,54X                                                   TFOP  195
      0,13H 0000   0000                                                 TFOP  196
      *,26X                                                             TFOP  197
      P,13H PPP    PPPP                                                 TFOP  198
      *,14X,1H*                                                         TFOP  199
      *,/, 5X,1H*,54X                                                   TFOP  200
      0,13H  000000000                                                  TFOP  201
      *,26X                                                             TFOP  202
      P,13H PPP       PPP                                               TFOP  203
      *,14X,1H*)                                                        TFOP  204
  150 FORMAT (                                                          TFOP  205
      *    5X,1H*,54X                                                   TFOP  206
      0,13H   0000000                                                   TFOP  207
      *,26X                                                             TFOP  208
      P,13H PPP       PPP                                               TFOP  209
      *,14X,1H*                                                         TFOP  210
      *,/, 5X,1H*,93X                                                   TFOP  211
      P,13H PPP       PPP                                               TFOP  212
      *,14X,1H*                                                         TFOP  213
      *,/, 5X,1H*,2X                                                    TFOP  214
      *,8(3HGGG), 40HGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGG,1X        TFOP  215
      *,26X                                                             TFOP  216
      P,13H PPP       PPP                                               TFOP  217
      *,14X,1H*)                                                        TFOP  218
  155 FORMAT (                                                          TFOP  219
      *    5X,1H*,2X                                                    TFOP  220
      *,8(3HGGG), 40HGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGG     ,1X        TFOP  221
      *,26X                                                             TFOP  222
      P,13H PPP     PPP                                                 TFOP  223
      *,14X,1H*                                                         TFOP  224
      *,/, 5X,1H*,2X                                                    TFOP  225
      *,24X,      40H  GGGGGGGGGGGGGGGGGGGGGGGGGGG           ,1X        TFOP  226
      *,26X                                                             TFOP  227
      P,13H PPP    PPP                                                  TFOP  228
      *,14X,1H*                                                         TFOP  229
```

```
     *,/, 5X,1H*,2X                                                    TFOP     230
     *,24X,      40H   GGGGGGGGGGGGGGGGGGGG                   ,1X      TFOP     231
     *,26X                                                             TFOP     232
     P,13H PPPPPPPPP                                                   TFOP     233
     *,14X,1H*)                                                        TFOP     234
 160 FORMAT (                                                          TFOP     235
     *     5X,1H*,2X                                                   TFOP     236
     *,5X,  15H..............,4X                                       TFOP     237
     *,          40H    GGGGGGGGGGGGGGGG                      ,1X      TFOP     238
     *,26X                                                             TFOP     239
     P,13H PPPPPPPP                                                    TFOP     240
     *,14X,1H*                                                         TFOP     241
     *,/, 5X,1H*,2X                                                    TFOP     242
     *,5X,  15H.             ..,4X                                     TFOP     243
     *,          40H   GGGGGGGGGGGGGGG                        ,1X      TFOP     244
     *,26X                                                             TFOP     245
     P,13H PPP                                                         TFOP     246
     *,14X,1H*                                                         TFOP     247
     *,/, 5X,1H*,2X                                                    TFOP     248
     *,5X,  15H.   GRUMMAN   ..,4X                                     TFOP     249
     *,          40H  GGGGGGGGGGGGGG                          ,1X      TFOP     250
     *,26X                                                             TFOP     251
     P,13H PPP                                                         TFOP     252
     *,14X,1H*)                                                        TFOP     253
 165 FORMAT (                                                          TFOP     254
     *     5X,1H*,2X                                                   TFOP     255
     *,5X,  15H.  AEROSPACE  ..,4X                                     TFOP     256
     *,          40H  GGGGGGGGGGGG                            ,1X      TFOP     257
     *,26X                                                             TFOP     258
     P,13H PPP                                                         TFOP     259
     *,14X,1H*                                                         TFOP     260
     *,/, 5X,1H*,2X                                                    TFOP     261
     *,5X,  15H. CORPORATION ..,4X                                     TFOP     262
     *,          40H  GGGGGGGGGG                              ,1X      TFOP     263
     *,26X                                                             TFOP     264
     P,13H PPP                                                         TFOP     265
     *,14X,1H*                                                         TFOP     266
     *,/, 5X,1H*,2X                                                    TFOP     267
     *,5X,  15H.             ..,4X                                     TFOP     268
     *,          40H  GGGGGGGG                                ,1X      TFOP     269
     *,26X                                                             TFOP     270
     P,13H PPP                                                         TFOP     271
     *,14X,1H*)                                                        TFOP     272
 170 FORMAT (  5X, 1H*, 2X                                             TFOP     273
     *,5X,  15H...............,4X                                      TFOP     274
     *,          40H  GGGGGG                                  ,1X      TFOP     275
     *,26X                                                             TFOP     276
     P,13H PPP                                                         TFOP     277
     *,14X,1H*                                                         TFOP     278
     *,/, 5X,1H*,2X                                                    TFOP     279
     *,24X,      40H  GGGG                                    ,1X      TFOP     280
     *,26X                                                             TFOP     281
     P,13H PPP                                                         TFOP     282
     *,14X,1H*                                                         TFOP     283
     *,/, 5X,1H*,2X                                                    TFOP     284
     *,24X,      40H  GG                                      ,1X      TFOP     285
     *,26X                                                             TFOP     286
```

```
                 P,13HPPPP                                                 TFOP      287
                 *,14X,1H*                                                 TFOP      288
                 *,/, 5X,1H*,2X                                            TFOP      289
                 *,24X,      40H  G                              ,1X       TFOP      290
                 *,26X                                                     TFOP      291
                 P,13HPPPP                 14X,1H*)                        TFOP      292
            175 FORMAT ( 5X,1H*,120X,1H*,/,5X,122(1H*))                    TFOP      293
       C                                                                   TFOP      294
                 RETURN                                                    TFOP      295
                 END                                                       TFOP      296
```

```
     SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS     DEF LINE     REFERENCES
    1  TFOP         14         294

VARIABLES      SN  TYPE           RELOCATION
    0  AFFDL       REAL      ARRAY  CAFFDL       REFS        16      23      56
    2  ITAPEP      INTEGER          COMRWP       REFS        18
    0  ITAPER      INTEGER          COMRWP       REFS        18
    7  ITAPET      INTEGER          CTABLE       REFS        21
    1  ITAPEW      INTEGER          COMRWP       REFS        18   I/O REFS   53      54      55      56      57
                                                   58        59      60      61      62      63      64      65
                                                   66        67      68
    7  KBPAGE      INTEGER          CLIST        REFS        19
    4  KLABEL      INTEGER          CLIST        REFS        19
    0  KOUNT       INTEGER          CLIST        REFS        19   DEFINED    28      48
   11  KOUNTH      INTEGER          CLIST        REFS        19
   12  KOUNTI      INTEGER          CLIST        REFS        19
    1  KPAGE       INTEGER          CLIST        REFS        19
    0  KTABLE      INTEGER          CTABLE       REFS        21   DEFINED    32      36      39      42      45
    5  KTABLO      INTEGER          CTABLE       REFS        21
    5  KTPAGE      INTEGER          CLIST        REFS        19
    2  LINES       INTEGER          CLIST        REFS        19      28      48
   10  LINESG      INTEGER          CLIST        REFS        19
    3  LINEST      INTEGER          CLIST        REFS        19
    3  NCOLS       INTEGER          CTABLE       REFS        21   DEFINED    30
    4  NCOLST      INTEGER          CTABLE       REFS        21
    6  NPAGE       INTEGER          CLIST        REFS        19
    6  NPAGEA      INTEGER          CTABLE       REFS        21
    1  NPASS       INTEGER          CTABLE       REFS        21
    2  NROWS       INTEGER          CTABLE       REFS        21   DEFINED    31      35
       VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS           TYPE   ARGS        REFERENCES
       PTABLE                3              33      37      40      43      46
       TITLES                1              29

STATEMENT LABELS             DEF LINE   REFERENCES
  201   100      FMT            69         53
  251   105      FMT            87         54
  317   110      FMT           103         55
```

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STATEMENT LABELS                DEF LINE   REFERENCES
  377  120      FMT               128         57
  424  125      FMT               144         58
  441  130      FMT               156         59
  454  135      FMT               166         60
  467  140      FMT               176         61
  504  145      FMT               188         62
  525  150      FMT               204         63
  547  155      FMT               218         64
  601  160      FMT               234         65
  641  165      FMT               253         66
  701  170      FMT               272         67
  745  175      FMT               292         68

COMMON BLOCKS    LENGTH     MEMBERS - BIAS NAME(LENGTH)
       COMRWP         3              0 ITAPER (1)             1 ITAPEW (1)             2 ITAPEP (1)
       CLIST         11              0 KOUNT  (1)             1 KPAGE  (1)             2 LINES  (1)
                                     3 LINEST (1)             4 KLABEL (1)             5 KTPAGE (1)
                                     6 NPAGE  (1)             7 KBPAGE (1)             8 LINESG (1)
                                     9 KOUNTH (1)            10 KOUNTI (1)
       CTABLE         8              0 KTABLE (1)             1 NPASS  (1)             2 NROWS  (1)
                                     3 NCOLS  (1)             4 NCOLST (1)             5 KTABLO (1)
                                     6 NPAGEA (1)             7 ITAPET (1)
       CAFFDL         4              0 AFFDL  (4)

STATISTICS
  PROGRAM LENGTH                 1017B      527
  CM LABELED COMMON LENGTH         32B       26
          52000B CM USED
```

```
C45730, SUB. LDB (LIST DATA - VERSION B)                                LDB        2
C                                                                       LDB        3
C***  SUBROUTINE LDB (NCOL,KHEAD,NTAPEI,ITAPEI,ITAPEO,SKIP)      ****** LDB        4
C***  OBJECTIVE  ********************************************************* LDB        5
C     ---------                                                       * LDB        6
C     TO READ AND LIST INPUT DATA FROM THE INPUT STREAM AND TO PREPARE * LDB        7
C     THE FORMATTED INPUT TAPE FOR THE USER'S PROGRAM.                 * LDB        8
C                                                                      * LDB        9
C                                                                      * LDB       10
C***  SUMMARY OF FORTRAN SYMBOLS  ************************************** LDB       11
C     --------------------------                                       * LDB       12
C                                                                      * LDB       13
C.... ITAPEI ....... INPUT                                             * LDB       14
C     FORMATTED INPUT TAPE IN USER'S ORIGINAL PROGRAM.                 * LDB       15
C                                                                      * LDB       16
C.... ITAPEO ....... INPUT                                             * LDB       17
C     TAPE FOR LISTING CARD DATA.                                      * LDB       18
C                                                                      * LDB       19
C.... KHEAD ........ INPUT                                             * LDB       20
C     CONTROL WORD FOR LISTING TITLE AT TOP OF PAGE AND COLUMN NUMBERS * LDB       21
C     AT TOP AND BOTTOM OF PAGE.                                       * LDB       22
C     KHEAD = 1, LIST TITLE AND COLUMN NUMBERS AT TOP OF PAGE ONLY.    * LDB       23
C     KHEAD = 2, LIST TITLE AT TOP OF PAGE AND COLUMN NUMBERS AT TOP   * LDB       24
C                AND BOTTOM OF PAGE.                                   * LDB       25
C     KHEAD = 3, DO NOT LIST TITLE AT TOP OF PAGE NOR COLUMN NUMBERS   * LDB       26
C                AT TOP AND BOTTOM OF PAGE.                            * LDB       27
C                                                                      * LDB       28
C.... LINES ........ INPUT                                             * LDB       29
C     NUMBER OF LINES TO BE LISTED.                                    * LDB       30
C                                                                      * LDB       31
C.... NCOL ......... INPUT                                             * LDB       32
C     NUMBER OF CARD COLUMNS LISTED BY PROGRAM (MUST BE A MULTIPLE OF  * LDB       33
C     FOUR).                                                           * LDB       34
C                                                                      * LDB       35
C.... NTAPEI ....... INPUT                                             * LDB       36
C     INPUT TAPE FOR READING CARD DATA IN THE INPUT STREAM (MUST BE    * LDB       37
C     DIFFERENT FROM INPUT TAPE IN USER'S ORIGINAL PROGRAM - THAT IS   * LDB       38
C     NTAPEI SHOULD NOT EQUAL ITAPEI)                                  * LDB       39
C                                                                      * LDB       40
C.... SKIP ......... INPUT                                             * LDB       41
C     CONTAINS THE NUMBER OF COLUMNS TO BE SKIPPED BEFORE THE INPUT    * LDB       42
C     DATA IS LISTED   THIS DATA MUST BE STORED IN THE VARIABLE SKIP   * LDB       43
C     USING THE DATA STATEMENT AS FOLLOWS.                             * LDB       44
C                                                                      * LDB       45
C     DATA SKIP /'NNX,'/                                               * LDB       46
C                                                                      * LDB       47
C     WHERE THE NUMBER  NN  REPRESENTS THE NUMBER OF COLUMNS WHICH ARE * LDB       48
C     TO BE SKIPPED AND SHOULD VARY FROM ONE TO A MAXIMUM OF ONE       * LDB       49
C     HUNDRED AND THIRTY TWO MINUS THE NUMBER OF CARD COLUMNS LISTED   * LDB       50
C     BY THE PROGRAM (NCOL).                                           * LDB       51
C                                                                      * LDB       52
C                                                                      * LDB       53
C     ERROR MESSAGES  ************************************************** LDB       54
C     --------------                                                   * LDB       55
C                                                                      * LDB       56
C     IF NO CARD DATA IS PROVIDED, AN ERROR MESSAGE IS PRINTED.        * LDB       57
C                                                                      * LDB       58
```

```
C                                                                        * LDB   59
C                                                                        * LDB   60
C************************************************************************* LDB   61
C                                                                          LDB   62
C                                                                          LDB   63
      SUBROUTINE LDB (NCOL,KHEAD,NTAPEI,ITAPEI,ITAPEO,SKIP)                LDB   64
C                                                                          LDB   65
      INTEGER YES                                                          LDB   66
C                                                                          LDB   67
      DIMENSION T1( 8), T2(20), T3(20), CARD(20)                           LDB   68
      DIMENSION FMT1(4)           ,FMT2(6)            ,FMT3(6)             LDB   69
     1         ,FMT4(4)           ,FMT5(5)            ,FMT6(5)             LDB   70
     2         ,FMT7(5)                                                    LDB   71
C                                                                          LDB   72
      COMMON /CLIST / KOUNT ,KPAGE ,LINES ,LINEST,KLABEL,KTPAGE,NPAGE      LDB   73
     1                ,KBPAGE,LINESG,KOUNTH,KOUNTI                         LDB   74
      COMMON /CONSTS/ NO    ,YES                                           LDB   75
C                                                                          LDB   76
C                                                                          LDB   77
C INITIALIZE VARIABLES                                                     LDB   78
C.... PSN(20) TO PSN(80) ....                                              LDB   79
   20 IF (NCOL  .LE. 0 .OR. NCOL  .GT. 80) NCOL  = 80                      LDB   80
      IF (KHEAD .LE. 0 .OR. KHEAD .GT. 3 ) KHEAD = 2                       LDB   81
      KEND   =  NO                                                         LDB   82
      LSKIP  =  1                                                          LDB   83
      LTITLE =  2                                                          LDB   84
      LREC   =  (NCOL-1)/4 + 1                                             LDB   85
      KFIRST =  YES                                                        LDB   86
      LCARD  =  20                                                         LDB   87
      KARD   =  0                                                          LDB   88
      DATA T1    /4H  PR,4HOGRA,4HM LI,4HSTIN,4HG OF,4H CAR,4HD DA         LDB   89
     1           ,4HTA  /                                                  LDB   90
      DATA T2    /4H....,4H....,4H.1..,4H....,4H ..2,4H....,4H....         LDB   91
     1           ,4H.3..,4H....,4H...4,4H....,4H....,4H.5..,4H....         LDB   92
     2           ,4H...6,4H....,4H....,4H.7..,4H....,4H...8/               LDB   93
      DATA T3    /4H1234,4H5678,4H9012,4H3456,4H7890,4H1234,4H5678         LDB   94
     1           ,4H9012,4H3456,4H7890,4H1234,4H5678,4H9012,4H3456         LDB   95
     2           ,4H7890,4H1234,4H5678,4H9012,4H3456,4H7890/               LDB   96
      DATA FMT1   /4H(   , 4H    , 4H6X,2, 4H0A4)/                         LDB   97
      DATA FMT2   /4H(   , 4H    , 4H1A4,, 4H    , 4H4X,2, 4H0A4)/         LDB   98
      DATA FMT3   /4H(   , 4H    , 4H1A4,, 4H    , 4H4X,2, 4H0A4)/         LDB   99
      DATA FMT4   /4H(   , 4H    , 4H8X,2, 4H0A4)/                         LDB  100
      DATA FMT5   /4H(   , 4H    , 4H28X,, 4H20A4, 4H)   /                 LDB  101
      DATA FMT6   /4H(   , 4H    , 4H32X,, 4H20A4, 4H)   /                 LDB  102
      DATA FMT7   /4H(   , 4H    , 4HI4.4, 4HX, 2, 4H0A4)/                 LDB  103
      DATA CARDH  /4HCARD/                                                 LDB  104
      DATA NUMBH  /4H NO./                                                 LDB  105
      DATA SIXI   /4H   6/                                                 LDB  106
      DATA EIGHTI /4H   8/                                                 LDB  107
      INCHES = 9                                                           LDB  108
      LINESI = 6                                                           LDB  109
      FMT1(2) =  SKIP                                                      LDB  110
      FMT2(2) =  SKIP                                                      LDB  111
      FMT3(2) =  SKIP                                                      LDB  112
   80 FMT4(2) =  SKIP                                                      LDB  113
      FMT5(2)=  SKIP                                                       LDB  114
      FMT6(2)=  SKIP                                                       LDB  115
```

```
          FMT7(2)=  SKIP                                              LDB     116
          CALL DTABLE (1,CARD)                                        LDB     117
C                                                                     LDB     118
C                                                                     LDB     119
C LIST INPUT DATA CARDS AND PREPARE TAPE ITAPEO                       LDB     120
C   . PSN(90) TO PSN(1500) ....                                       LDB     121
   90 REWIND ITAPEI                                                   LDB     122
      WRITE (ITAPEI,2000) SKIP                                        LDB     123
      REWIND ITAPEI                                                   LDB     124
      CALL EOFO1 (NTAPEI,CARD,LCARD,KEOF)                             LDB     125
      KARD   =  KARD + 1                                              LDB     126
      IF (KEOF .EQ. YES) GO TO 1000                                   LDB     127
      IF (CARD(2) .EQ. SIXI  ) LINESI = 6                             LDB     128
      IF (CARD(2) .EQ. EIGHTI) LINESI = 8                             LDB     129
      LINEST =  LINESI - 2                                            LDB     130
      LINES  =  LINESI*INCHES                                         LDB     131
      KOUNT  =  LINES                                                 LDB     132
  100 CONTINUE                                                        LDB     133
      IF (KOUNT .LT. LINES) GO TO 300                                 LDB     134
      CALL TITLES (-1)                                                LDB     135
      CALL PTABLE (2,28,28HPROGRAM LISTING OF CARD DATA)              LDB     136
      IF (LTITLE .GT. O) CALL DTABLE (2,CARD)                         LDB     137
      KOUNT  =  O                                                     LDB     138
      IF (KHEAD .EQ. 3) GO TO 200                                     LDB     139
      IF (LREC .EQ. 18 .OR. LREC .EQ. 20) GO TO 150                   LDB     140
      WRITE (ITAPEO,FMT1) (T1(L),L=1,8)                               LDB     141
  150 CONTINUE                                                        LDB     142
      KOUNT  =  KOUNT + LSKIP + LTITLE + 2                            LDB     143
      IF (LTITLE .EQ. O) GO TO 160                                    LDB     144
      IF (LREC .EQ. 18) WRITE (ITAPEO,FMT5) (T1(L), L=1,8)            LDB     145
      IF (LREC .EQ. 20) WRITE (ITAPEO,FMT6) (T1(L), L=1,8)            LDB     146
      CALL PLB (1,1,ITAPEO)                                           LDB     147
      LTITLE =  O                                                     LDB     148
  160 CONTINUE                                                        LDB     149
      WRITE (ITAPEO,FMT2) CARDH, (T2(L), L=1,LREC)                    LDB     150
      WRITE (ITAPEO,FMT3) NUMBH, (T3(L), L=1,LREC)                    LDB     151
      CALL PLB (1,LSKIP,ITAPEO)                                       LDB     152
  200 CONTINUE                                                        LDB     153
  300 CONTINUE                                                        LDB     154
      CALL DTABLE (3,CARD)                                            LDB     155
      IF (KFIRST .EQ. YES) GO TO 310                                  LDB     156
      CALL EOFO1 (NTAPEI,CARD,LCARD,KEOF)                             LDB     157
      CALL ENDP (CARD)                                                LDB     158
      KARD   =  KARD + 1                                              LDB     159
      IF (KEOF .EQ. YES) GO TO 900                                    LDB     160
  310 CONTINUE                                                        LDB     161
      KFIRST =  NO                                                    LDB     162
      IF (NTAPEI .EQ. ITAPEI) GO TO 350                               LDB     163
      WRITE (ITAPEI,2000) CARD                                        LDB     164
  350 CONTINUE                                                        LDB     165
      WRITE (ITAPEO,FMT7) KARD, CARD                                  LDB     166
      KOUNT  =  KOUNT + 1                                             LDB     167
      IF (KOUNT .LT. (LINES-(LSKIP+2))) GO TO 300                     LDB     168
      IF (KHEAD .EQ. 1 .OR. KHEAD .EQ. 3) GO TO 600                   LDB     169
  400 CONTINUE                                                        LDB     170
      CALL PLB (1,LSKIP,ITAPEO)                                       LDB     171
```

```
      WRITE (ITAPEO,FMT4) (T3(L), L=1,LREC)                             LDB   173
      KOUNT  =  KOUNT + LSKIP + 2                                       LDB   174
  600 CONTINUE                                                          LDB   175
      IF (KEND .EQ. YES) GO TO 950                                      LDB   176
      GO TO 100                                                         LDB   177
  900 CONTINUE                                                          LDB   178
      IF (KHEAD .EQ. 1 .OR. KHEAD .EQ. 3) GO TO 950                     LDB   179
      KEND   =  YES                                                     LDB   180
      LSKIP  =  LINES - KOUNT - 2                                       LDB   181
      GO TO 400                                                         LDB   182
  950 CONTINUE                                                          LDB   183
      REWIND ITAPEI                                                     LDB   184
      GO TO 1500                                                        LDB   185
 1000 CONTINUE                                                          LDB   186
      WRITE (ITAPEO,3000)                                               LDB   187
      CALL EXIT                                                         LDB   188
 1500 CONTINUE                                                          LDB   189
C                                                                       LDB   190
C                                                                       LDB   191
C FORMATS                                                               LDB   192
 2000 FORMAT ( 20A4)                                                    LDB   193
 3000 FORMAT (1H1,///,10X,41H*** ERROR MESSAGE FROM SUBROUTINE LDB ***  LDB   194
     1           ,  /,10X,72HEXECUTION TERMINATED - CARD INPUT DATA HAS LDB   195
     2NOT BEEN PROVIDED IN THIS RUN )                                   LDB   196
C                                                                       LDB   197
      RETURN                                                            LDB   198
      END                                                               LDB   199
```

SYMBOLIC REFERENCE MAP (R=3)

```
ENTRY POINTS      DEF LINE     REFERENCES
   3  LDB            63          197

VARIABLES      SN  TYPE            RELOCATION
  504  CARD        REAL      ARRAY                 REFS        67       116       124       127       128       136       154
                                                    156       157       163       165
  277  CARDH       REAL                            REFS       149   DEFINED       103
  302  EIGHTI      REAL                            REFS       128   DEFINED       106
  530  FMT1        REAL      ARRAY                 REFS        68       140   DEFINED        96       109
  534  FMT2        REAL      ARRAY                 REFS        68       149   DEFINED        97       110
  542  FMT3        REAL      ARRAY                 REFS        68       150   DEFINED        98       111
  550  FMT4        REAL      ARRAY                 REFS        68       171       172   DEFINED        99       112
  554  FMT5        REAL      ARRAY                 REFS        68       144   DEFINED       100       113
  561  FMT6        REAL      ARRAY                 REFS        68       145   DEFINED       101       114
  566  FMT7        REAL      ARRAY                 REFS        68       165   DEFINED       102       115
  420  INCHES      INTEGER                         REFS       130   DEFINED       107
    0  ITAPEI      INTEGER            F.P.         REFS       162   DEFINED        63  I/O REFS       121       122       123
                                                    163       183
    0  ITAPEO      INTEGER            F.P.         REFS       146       151       170   DEFINED        63
                                               I/O REFS       140       144       145       149       150       165       171
                                                    172       186
  417  KARD        INTEGER                         REFS       125       158       165   DEFINED        87       125       158
    7  KRPAGE      INTEGER           CLIST         REFS        72
```

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VARIABLES     SN  TYPE          RELOCATION
   411  KEND      INTEGER                        REFS       175   DEFINED      81      179
   422  KEOF      INTEGER                        REFS       124      126      156      159
   415  KFIRST    INTEGER                        REFS       155   DEFINED      85      161
     0  KHEAD     INTEGER             F.P.       REFS      2*80      138    2*168    2*178   DEFINED      63      80
     4  KLABEL    INTEGER             CLIST      REFS        72
     0  KOUNT     INTEGER             CLIST      REFS        72      133      142      166      167     173     180
                                              DEFINED       131      137      142      166      173
    11  KOUNTH    INTEGER             CLIST      REFS        72
    12  KOUNTI    INTEGER             CLIST      REFS        72
     1  KPAGE     INTEGER             CLIST      REFS        72
     5  KTPAGE    INTEGER             CLIST      REFS        72
   423  L         INTEGER                        REFS       140      144      145      149      150     171     172
                                              DEFINED       140      144      145      149      150     171     172
   416  LCARD     INTEGER                        REFS       124      156   DEFINED      86
     2  LINES     INTEGER             CLIST      REFS        72      131      133      167      180
                                              DEFINED       130
    10  LINESG    INTEGER             CLIST      REFS        72
   421  LINESI    INTEGER                        REFS       129      130   DEFINED     108      127     128
     3  LINEST    INTEGER             CLIST      REFS        72   DEFINED     129
   414  LREC      INTEGER                        REFS     2*139      144      145      149      150     171     172
                                              DEFINED        84
   412  LSKIP     INTEGER                        REFS       142      151      167      170      173
                                              DEFINED        82      180
   413  LTITLE    INTEGER                        REFS       136      142      143   DEFINED      83     147
     0  NCOL      INTEGER             F.P.       REFS      2*79       84   DEFINED      63       79
     0  NO        INTEGER             CONSTS     REFS        74       81      161
     6  NPAGE     INTEGER             CLIST      REFS        72
     0  NTAPEI    INTEGER             F.P.       REFS       124      156      162   DEFINED      63
   300  NUMBH     INTEGER                        REFS       150   DEFINED     104
   301  SIXI      REAL                           REFS       127   DEFINED     105
     0  SKIP      REAL                F.P.       REFS       109      110      111      112      113     114     115
                                                 122   DEFINED        63
   424  T1        REAL       ARRAY               REFS        67      140      144      145   DEFINED      88
   434  T2        REAL       ARRAY               REFS        67      149      171   DEFINED      90
   460  T3        REAL       ARRAY               REFS        67      150      172   DEFINED      93
     1  YES       INTEGER             CONSTS     REFS        65       74       85      126      155     159     175
                                                 179
        VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS           TYPE    ARGS        REFERENCES
        DTABLE               2            116       136       154
        ENDP                 1            157
        EOFO1                4            124       156
        EXIT                 0            187
        PLB                  3            146       151       170
        PTABLE               3            135
        TITLES               1            134

STATEMENT LABELS              DEF LINE   REFERENCES
     0  20          INACTIVE     79
     0  80          INACTIVE    112
     0  90          INACTIVE    121
    64  100                     132        176
   107  150                     141        139
   126  160                     148        143
   143  200                     152        138
   143  300                     153        133       167
```

```
STATEMENT LABELS               DEF LINE   REFERENCES
  160  310                       160         155
  165  350                       164         162
  177  400                       169         181
  217  600                       174         168
  222  900                       177         159
  233  950                       182         175       178
  236   1000                     185         126
  241   1500                     188         184
  364  2000     FMT              192         122       163
  366  3000     FMT              193         186

COMMON BLOCKS   LENGTH     MEMBERS - BIAS NAME(LENGTH)
       CLIST        11                0 KOUNT  (1)              1 KPAGE  (1)              2 LINES  (1)
                                      3 LINEST (1)              4 KLABEL (1)              5 KTPAGE (1)
                                      6 NPAGE  (1)              7 KBPAGE (1)              8 LINESG (1)
                                      9 KOUNTH (1)             10 KOUNTI (1)
       CONSTS        2                0 NO     (1)              1 YES    (1)

STATISTICS
  PROGRAM LENGTH                 577B      383
  CM LABELED COMMON LENGTH        15B       13
         52000B CM USED
```

```
C45700, SUB. SETUP (ASSIGN TAPE AND DISK UNITS FOR VARIOUS DATA BLOCKS) SETUP       2
C                                                                       SETUP       3
C********************************************************************** SETUP       4
C                                                                     * SETUP       5
C***  SUBROUTINE SETUP  *********************************************** SETUP       6
C                                                                     * SETUP       7
C***  COMPUTER VERSION  *********************************************** SETUP       8
C     ----------------                                                * SETUP       9
C     IBM .... AS IS.                                                 * SETUP      10
C                                                                     * SETUP      11
C     CDC .... AS IS.                                                 * SETUP      12
C                                                                     * SETUP      13
C***  OBJECTIVE  ****************************************************** SETUP      14
C     ---------                                                       * SETUP      15
C     COLLECTS TOGETHER ALL THE TAPE AND DISK UNIT ASSIGNMENTS.       * SETUP      16
C                                                                     * SETUP      17
C***  INPUT/OUTPUT  *************************************************** SETUP      18
C     ------------                                                    * SETUP      19
C     NO INPUT TO THIS PROGRAM.  OUTPUT CONSISTS OF UNIT NUMBERS THAT * SETUP      20
C     WILL STORE THE DIFFERENT SETS OF DATA NEEDED IN THE PROGRAM.    * SETUP      21
C                                                                     * SETUP      22
C***  SUMMARY OF SYMBOLS  ********************************************* SETUP      23
C     ------------------                                              * SETUP      24
C                                                                     * SETUP      25
C***  ERROR MESSAGES  ************************************************* SETUP      26
C     --------------                                                  * SETUP      27
C     NONE.                                                             SETUP      28
C                                                                     * SETUP      29
C********************************************************************** SETUP      30
C                                                                       SETUP      31
      SUBROUTINE SETUP(KINIT)                                           SETUP      32
C                                                                       SETUP      33
C                                                                       SETUP      34
      DIMENSION ISETUP(45),IPOS(20),IFILES(50),ITAPES(50),JSETUP(25)    SETUP      35
C                                                                       SETUP      36
      COMMON /DSRN  / JSETUP                                            SETUP      37
      COMMON /FILE  / IPOS                                              SETUP      38
      COMMON /MATRIX/ ISETUP                                            SETUP      39
      COMMON /SUM   / LST   ,LSF   ,LDT   ,LDF   ,LMT   ,LMF            SETUP      40
      COMMON /CSETUP/ IOINC                                             SETUP      41
      COMMON /CFILES/ KFILES,IFILES                                     SETUP      42
      COMMON /CTAPES/ ITAPES                                            SETUP      43
C                                                                       SETUP      44
C                                                                       SETUP      45
C                                                                       SETUP      46
C DEFINE BASIC I/O UNITS AND FILES                                      SETUP      47
C                                                                       SETUP      48
      IF (KINIT .EQ. 1) GO TO 100                                       SETUP      49
      MTAPES = ITAPES(1)                                                SETUP      50
      MPOS   = IPOS(1)                                                  SETUP      51
  100 CONTINUE                                                          SETUP      52
      DO 130 I=1,MTAPES                                                 SETUP      53
      IFILES(I) = 1                                                     SETUP      54
  130 ITAPES(I) = I                                                     SETUP      55
      ITAPES( 2) =  17                                                  SETUP      56
      ITAPES( 8) =  18                                                  SETUP      57
      ITAPES(13) =  13 - IOINC                                          SETUP      58
```

```
LOOPS  LABEL    INDEX      FROM-TO     LENGTH    PROPERTIES
  115  600      MOD         105 110       15B                 EXITS   NOT INNER
  120  600      NPA         107 110        7B     INSTACK     EXITS

COMMON BLOCKS    LENGTH     MEMBERS - BIAS NAME(LENGTH)
       CONSTS         2               0 NO     (1)               1 YES    (1)
       CTABLE         8               0 KTABLE (1)               1 NPASS  (1)              2 NROWS  (1)
                                      3 NCOLS  (1)               4 NCOLST (1)              5 KTABLO (1)
                                      6 NPAGEA (1)               7 ITAPET (1)

STATISTICS
  PROGRAM LENGTH                  1317B      719
  CM LABELED COMMON LENGTH          12B       10
         52000B CM USED
```

```
STATEMENT LABELS          DEF LINE   REFERENCES
  342  3080                  247       215
  343  3090                  249       215
  344  4000                  255       117
  363  4001                  259       257
  370  4010                  265       257
  371  4020                  267       257
  372  4030                  269       257
  373  4040                  271       257
  374  4050                  273       257
  375  4060                  275       257
  376  4070                  277       257
  377  4080                  279       257
  400  4090                  281       257
  401  5000                  287       117
  420  5001                  291       289
  425  5010                  297       289
  426  5020                  299       289
  427  5030                  301       289
  430  5040                  303       289
  430  5050                  304       289
  431  5060                  306       289
  432  5070                  308       289
  433  5080                  310       289
  434  5090                  312       289
  435  6000                  318       117
  454  6001                  322       320
  461  6010                  328       320
  462  6020                  330       320
  463  6030                  332       320
  464  6040                  334       320
  465  6050                  336       320
  466  6060                  338       320
  467  6070                  340       320
  470  6080                  342       320
  471  6090                  344       320
  472  7000                  350       117
  511  7001                  354       352
  516  7010                  360       352
  517  7020                  362       352
  520  7030                  364       352
  521  7040                  366       352
  522  7050                  368       352
  523  7060                  370       352
  524  7070                  372       352
  525  7080                  374       352
  526  7090                  376       352
  526  10000                 378       111    132    136    140    142    146    148    150    154
                                       156    158    172    176    180    184    188    192    196
                                       200    204    208    222    226    230    234    238    242
                                       244    246    248    250    264    266    268    270    272
                                       274    276    278    280    282    296    298    300    302
                                       305    307    309    311    313    327    329    331    333
                                       335    337    339    341    343    345    359    361    363
                                       365    367    369    371    373    375
  530  20000                 380        89    101
```

```
VARIABLES     SN  TYPE          RELOCATION
  730  SA07       REAL                          REFS        69   DEFINED      36
  731  SA08       REAL                          REFS        70   DEFINED      37
  732  SA09       REAL                          REFS        71   DEFINED      38
  711  SOP        REAL                          REFS        96   DEFINED      14
  741  S000       REAL                          REFS        81   DEFINED      45
  735  TAC1       REAL                          REFS        75   DEFINED      41
  736  TAC2       REAL                          REFS        76   DEFINED      42
  737  TAC3       REAL                          REFS        77   DEFINED      43
  740  TADG       REAL                          REFS        78   DEFINED      44
  733  TA00       REAL                          REFS        79   DEFINED      39
  734  TA01       REAL                          REFS        74   DEFINED      40
  742  VA00       REAL                          REFS        83   DEFINED      46
    1  YES        INTEGER            CONSTS     REFS         6        11     113

EXTERNALS          TYPE   ARGS      REFERENCES
       DVALUE               3          53
       PTABLE               3          96      98     130     134     138     144     152     170     174
                                      178     182     186     190     194     198     202     206     220
                                      224     228     232     236     240     262     294     325     357

STATEMENT LABELS              DEF LINE   REFERENCES
   16  100                       18        17
  100  400                       90        17
   14  500                      102        17
    0  600                      110       105     107
  132  610                      112       109
  151  1000                     123       117
  170  1001                     127       125
  175  1010                     133       125
  200  1020                     137       125
  203  1030                     141       125
  204  1040                     143       125
  207  1050                     147       125
  210  1060                     149       125
  211  1070                     151       125
  214  1080                     155       125
  215  1090                     157       125
  216  2000                     163       117
  235  2001                     167       165
  242  2010                     173       165
  245  2020                     177       165
  250  2030                     181       165
  253  2040                     185       165
  256  2050                     189       165
  261  2060                     193       165
  264  2070                     197       165
  267  2080                     201       165
  272  2090                     205       165
  275  3000                     213       117
  314  3001                     217       215
  321  3010                     223       215
  324  3020                     227       215
  327  3030                     231       215
  332  3040                     235       215
  335  3050                     239       215
  340  3060                     243       215
  341  3070                     245       215
```

```
ENTRY POINTS      DEF LINE      REFERENCES
    3  DTABLE          4          382

VARIABLES      SN  TYPE            RELOCATION
  713  BLANK       REAL                          REFS        53   DEFINED        23
    0  CARD        REAL                  F.P.    REFS        96        98       109   DEFINED         4
 1013  CARD1       REAL        ARRAY             REFS         9        53       109   DEFINED        57        58        59
                                                   60        61        63        64        65        66        67        68
                                                   69        70        71        72        74        75        76        77
                                                   78        79        81        83        85        87
  743  FA00        REAL                          REFS        85   DEFINED        47
  712  FOP         REAL                          REFS        98   DEFINED        15
  744  F000        REAL                          REFS        87   DEFINED        48
    7  ITAPET      INTEGER             CTABLE    REFS        12
    0  KINIT       INTEGER               F.P.    REFS        17   DEFINED         4
    0  KTABLE      INTEGER             CTABLE    REFS        12   DEFINED        95       113       379
    5  KTABLO      INTEGER             CTABLE    REFS        12
  777  LAST        INTEGER                       REFS        61        72        79        81        83        85        87
                                               DEFINED       54
  714  LA00        REAL                          REFS         7        61   DEFINED        24
  715  LA01        REAL                          REFS         7        57   DEFINED        25
  716  LA02        REAL                          REFS         7        58   DEFINED        26
  717  LA04        REAL                          REFS         7        59   DEFINED        27
  720  LA07        REAL                          REFS         7        60   DEFINED        28
  776  MAX         INTEGER                       REFS        53   DEFINED        52
  774  MAXMOD      INTEGER                       REFS        52       105   DEFINED        50
  775  MAXPAR      INTEGER                       REFS        52        54       107   DEFINED        51
 1007  MOD         INTEGER                       REFS       106   DEFINED       105
 1005  MODFA       INTEGER                       REFS        85   DEFINED        84
 1006  MODFO       INTEGER                       REFS        87   DEFINED        86
 1000  MODLA       INTEGER                       REFS        57        58        59        60        61
                                               DEFINED       56
 1001  MODSA       INTEGER                       REFS        63        64        65        66        67        68        69
                                                   70        71        72   DEFINED        62
 1003  MODSO       INTEGER                       REFS        81   DEFINED        80
 1002  MODTA       INTEGER                       REFS        74        75        76        77        78        79
                                               DEFINED       73
 1010  MODULE      INTEGER                       REFS       109       117   DEFINED       106
 1004  MODVA       INTEGER                       REFS        83   DEFINED        82
    3  NCOLS       INTEGER             CTABLE    REFS        12   DEFINED        94       115       129       169       219
                                                  261       293       324       356
    4  NCOLST      INTEGER             CTABLE    REFS        12
    0  NO          INTEGER             CONSTS    REFS        11       379
 1011  NPA         INTEGER                       REFS       108   DEFINED       107
    6  NPAGEA      INTEGER             CTABLE    REFS        12
 1012  NPART       INTEGER                       REFS       109       125       165       215       257       289       320
                                                  352   DEFINED       108
    1  NPASS       INTEGER             CTABLE    REFS        12
    2  NROWS       INTEGER             CTABLE    REFS        12   DEFINED        93       114       128       168       218
                                                  260       292       323       355
  721  SA00        REAL                          REFS        72   DEFINED        29
  722  SA01        REAL                          REFS        63   DEFINED        30
  723  SA02        REAL                          REFS        64   DEFINED        31
  724  SA03        REAL                          REFS        65   DEFINED        32
  725  SA04        REAL                          REFS        66   DEFINED        33
  726  SA05        REAL                          REFS        67   DEFINED        34
  727  SA06        REAL                          REFS        68   DEFINED        35
```

```
         GO TO 10000                                                  DTABLE     344
    6090 CONTINUE                                                     DTABLE     345
         GO TO 10000                                                  DTABLE     346
C                                                                     DTABLE     347
C                                                                     DTABLE     348
C AUTOMATED FLUTTER OPTIMIZATION MODULE                               DTABLE     349
C                                                                     DTABLE     350
    7000 CONTINUE                                                     DTABLE     351
C                                                                     DTABLE     352
         GO TO (7010,7020,7030,7040,7050,7060,7070,7080,7090,7001), NPART DTABLE 353
C                                                                     DTABLE     354
    7001 CONTINUE                                                     DTABLE     355
         NROWS  =  1                                                  DTABLE     356
         NCOLS  =  3                                                  DTABLE     357
         CALL PTABLE (2,37,37                                         DTABLE     358
        1   HAUTOMATED FLUTTER OPTIMIZATION MODULE)                   DTABLE     359
         GO TO 10000                                                  DTABLE     360
    7010 CONTINUE                                                     DTABLE     361
         GO TO 10000                                                  DTABLE     362
    7020 CONTINUE                                                     DTABLE     363
         GO TO 10000                                                  DTABLE     364
    7030 CONTINUE                                                     DTABLE     365
         GO TO 10000                                                  DTABLE     366
    7040 CONTINUE                                                     DTABLE     367
         GO TO 10000                                                  DTABLE     368
    7050 CONTINUE                                                     DTABLE     369
         GO TO 10000                                                  DTABLE     370
    7060 CONTINUE                                                     DTABLE     371
         GO TO 10000                                                  DTABLE     372
    7070 CONTINUE                                                     DTABLE     373
         GO TO 10000                                                  DTABLE     374
    7080 CONTINUE                                                     DTABLE     375
         GO TO 10000                                                  DTABLE     376
    7090 CONTINUE                                                     DTABLE     377
C                                                                     DTABLE     378
   10000 CONTINUE                                                     DTABLE     379
         KTABLE =  NO                                                 DTABLE     380
   20000 CONTINUE                                                     DTABLE     381
C                                                                     DTABLE     382
         RETURN                                                       DTABLE     383
         END                                                          DTABLE     384
```

CARD NR.	SEVERITY	DETAILS	DIAGNOSIS OF PROBLEM
17	I		AN IF STATEMENT MAY BE MORE EFFICIENT THAN A 2 OR 3 BRANCH COMPUTED GO TO STATEMENT.

SYMBOLIC REFERENCE MAP (R=3)

```
      C                                                                 DTABLE    287
       5000 CONTINUE                                                    DTABLE    288
      C                                                                 DTABLE    289
            GO TO (5010,5020,5030,5040,5050,5060,5070,5080,5090,5001), NPART DTABLE    290
      C                                                                 DTABLE    291
       5001 CONTINUE                                                    DTABLE    292
            NROWS  =  1                                                 DTABLE    293
            NCOLS  =  3                                                 DTABLE    294
            CALL PTABLE (2,35,35                                        DTABLE    295
           1   HAUTOMATED VIBRATION ANALYSIS MODULE)                    DTABLE    296
            GO TO 10000                                                 DTABLE    297
       5010 CONTINUE                                                    DTABLE    298
            GO TO 10000                                                 DTABLE    299
       5020 CONTINUE                                                    DTABLE    300
            GO TO 10000                                                 DTABLE    301
       5030 CONTINUE                                                    DTABLE    302
            GO TO 10000                                                 DTABLE    303
       5040 CONTINUE                                                    DTABLE    304
       5050 CONTINUE                                                    DTABLE    305
            GO TO 10000                                                 DTABLE    306
       5060 CONTINUE                                                    DTABLE    307
            GO TO 10000                                                 DTABLE    308
       5070 CONTINUE                                                    DTABLE    309
            GO TO 10000                                                 DTABLE    310
       5080 CONTINUE                                                    DTABLE    311
            GO TO 10000                                                 DTABLE    312
       5090 CONTINUE                                                    DTABLE    313
            GO TO 10000                                                 DTABLE    314
      C                                                                 DTABLE    315
      C                                                                 DTABLE    316
      C AUTOMATED FLUTTER ANALYSIS MODULE                                DTABLE    317
      C                                                                 DTABLE    318
       6000 CONTINUE                                                    DTABLE    319
      C                                                                 DTABLE    320
            GO TO (6010,6020,6030,6040,6050,6060,6070,6080,6090,6001), NPART DTABLE    321
      C                                                                 DTABLE    322
       6001 CONTINUE                                                    DTABLE    323
            NROWS  =  1                                                 DTABLE    324
            NCOLS  =  3                                                 DTABLE    325
            CALL PTABLE (2,33,33                                        DTABLE    326
           1   HAUTOMATED FLUTTER ANALYSIS MODULE)                      DTABLE    327
            GO TO 10000                                                 DTABLE    328
       6010 CONTINUE                                                    DTABLE    329
            GO TO 10000                                                 DTABLE    330
       6020 CONTINUE                                                    DTABLE    331
            GO TO 10000                                                 DTABLE    332
       6030 CONTINUE                                                    DTABLE    333
            GO TO 10000                                                 DTABLE    334
       6040 CONTINUE                                                    DTABLE    335
            GO TO 10000                                                 DTABLE    336
       6050 CONTINUE                                                    DTABLE    337
            GO TO 10000                                                 DTABLE    338
       6060 CONTINUE                                                    DTABLE    339
            GO TO 10000                                                 DTABLE    340
       6070 CONTINUE                                                    DTABLE    341
            GO TO 10000                                                 DTABLE    342
```

```
     1   HCORRESPONDENCE TABLE FOR AERODYNAMICS GRID)
      GO TO 10000
 3030 CONTINUE
      CALL PTABLE (2,37,37
     1   HCORRESPONDENCE TABLE FOR WEIGHT  GRID)
      GO TO 10000
 3040 CONTINUE
      CALL PTABLE (2,38,38
     1   HCORRESPONDENCE TABLE FOR DYNAMICS GRID)
      GO TO 10000
 3050 CONTINUE
      CALL PTABLE (2,37,37
     1   HDYNAMICS GRID TO GENERATE FLEXIBILITY)
      GO TO 10000
 3060 CONTINUE
      GO TO 10000
 3070 CONTINUE
      GO TO 10000
 3080 CONTINUE
      GO TO 10000
 3090 CONTINUE
      GO TO 10000
C
C
C AUTOMATED STRUCTURAL OPTIMIZATION MODULE
C
 4000 CONTINUE
C
      GO TO (4010,4020,4030,4040,4050,4060,4070,4080,4090,4001), NPART
C
 4001 CONTINUE
      NROWS  =  1
      NCOLS  =  3
      CALL PTABLE (2,40,40
     1   HAUTOMATED STRUCTURAL OPTIMIZATION MODULE)
      GO TO 10000
 4010 CONTINUE
      GO TO 10000
 4020 CONTINUE
      GO TO 10000
 4030 CONTINUE
      GO TO 10000
 4040 CONTINUE
      GO TO 10000
 4050 CONTINUE
      GO TO 10000
 4060 CONTINUE
      GO TO 10000
 4070 CONTINUE
      GO TO 10000
 4080 CONTINUE
      GO TO 10000
 4090 CONTINUE
      GO TO 10000
C
C
C AUTOMATED VIBRATION ANALYSIS MODULE
```

```
      GO TO 10000
 2010 CONTINUE
      CALL PTABLE (2,44,44
     1   HGEOMETRY COORDINATES AND BOUNDARY CONDITIONS)
      GO TO 10000
 2020 CONTINUE
      CALL PTABLE (2,25,25
     1   HGEOMETRY COORDINATES ONLY)
      GO TO 10000
 2030 CONTINUE
      CALL PTABLE (2,24,24
     1   HBOUNDARY CONDITIONS ONLY)
      GO TO 10000
 2040 CONTINUE
      CALL PTABLE (2,27,27
     1   HMATERIAL PROPERTIES UPDATES)
      GO TO 10000
 2050 CONTINUE
      CALL PTABLE (2,17,17
     1   HMEMBER PROPERTIES)
      GO TO 10000
 2060 CONTINUE
      CALL PTABLE (2,15,15
     1   HLOAD CONDITIONS)
      GO TO 10000
 2070 CONTINUE
      CALL PTABLE (2,29,29
     1   HCONDENSED BOUNDARY CONDITIONS)
      GO TO 10000
 2080 CONTINUE
      CALL PTABLE (2,32,32
     1   HDEFLECTION CONSTRAINT CONDITIONS)
      GO TO 10000
 2090 CONTINUE
      CALL PTABLE (2,20,20
     1   HSTABILITY CONDITIONS)
      GO TO 10000
C
C
C AUTOMATED TRANSFORMATION ANALYSIS MODULE
C
 3000 CONTINUE
C
      GO TO (3010,3020,3030,3040,3050,3060,3070,3080,3090,3001), NPART
C
 3001 CONTINUE
      NROWS  =  1
      NCOLS  =  3
      CALL PTABLE (2,40,40
     1   HAUTOMATED TRANSFORMATION ANALYSIS MODULE)
      GO TO 10000
 3010 CONTINUE
      CALL PTABLE (2,24,24
     1   HSTRUCTURES GEOMETRY GRID)
      GO TO 10000
 3020 CONTINUE
      CALL PTABLE (2,42,42
```

```
            NCOLS   =  6                                                         DTABLE    116
      C                                                                          DTABLE    117
            GO TO (1000, 2000, 3000, 4000, 5000, 6000, 7000), MODULE             DTABLE    118
      C                                                                          DTABLE    119
      C                                                                          DTABLE    120
      C                                                                          DTABLE    121
      C AUTOMATED LOAD ANALYSIS MODULE                                           DTABLE    122
      C                                                                          DTABLE    123
       1000 CONTINUE                                                             DTABLE    124
      C                                                                          DTABLE    125
            GO TO (1010,1020,1030,1040,1050,1060,1070,1080,1090,1001), NPART     DTABLE    126
      C                                                                          DTABLE    127
       1001 CONTINUE                                                             DTABLE    128
            NROWS   =  1                                                         DTABLE    129
            NCOLS   =  3                                                         DTABLE    130
            CALL PTABLE (2,30,30                                                 DTABLE    131
           1   HAUTOMATED LOAD ANALYSIS MODULE)                                  DTABLE    132
            GO TO 10000                                                          DTABLE    133
       1010 CONTINUE                                                             DTABLE    134
            CALL PTABLE (2,52,52                                                 DTABLE    135
           1   HAERODYNAMIC INFLUENCE COEFFICIENTS FOR SUBSONIC FLOW)            DTABLE    136
            GO TO 10000                                                          DTABLE    137
       1020 CONTINUE                                                             DTABLE    138
            CALL PTABLE (2,54,54                                                 DTABLE    139
           1   HAERODYNAMIC INFLUENCE COEFFICIENTS FOR SUPERSONIC FLOW)          DTABLE    140
            GO TO 10000                                                          DTABLE    141
       1030 CONTINUE                                                             DTABLE    142
            GO TO 10000                                                          DTABLE    143
       1040 CONTINUE                                                             DTABLE    144
            CALL PTABLE (2,17,17                                                 DTABLE    145
           1   HAERODYNAMIC LOADS)                                               DTABLE    146
            GO TO 10000                                                          DTABLE    147
       1050 CONTINUE                                                             DTABLE    148
            GO TO 10000                                                          DTABLE    149
       1060 CONTINUE                                                             DTABLE    150
            GO TO 10000                                                          DTABLE    151
       1070 CONTINUE                                                             DTABLE    152
            CALL PTABLE (2,14,14                                                 DTABLE    153
           1   HINERTIAL LOADS)                                                  DTABLE    154
            GO TO 10000                                                          DTABLE    155
       1080 CONTINUE                                                             DTABLE    156
            GO TO 10000                                                          DTABLE    157
       1090 CONTINUE                                                             DTABLE    158
            GO TO 10000                                                          DTABLE    159
      C                                                                          DTABLE    160
      C                                                                          DTABLE    161
      C AUTOMATED STRUCTURAL ANALYSIS MODULE                                     DTABLE    162
      C                                                                          DTABLE    163
       2000 CONTINUE                                                             DTABLE    164
      C                                                                          DTABLE    165
            GO TO (2010,2020,2030,2040,2050,2060,2070,2080,2090,2001), NPART     DTABLE    166
      C                                                                          DTABLE    167
       2001 CONTINUE                                                             DTABLE    168
            NROWS   =  1                                                         DTABLE    169
            NCOLS   =  3                                                         DTABLE    170
            CALL PTABLE (2,36,36                                                 DTABLE    171
           1   HAUTOMATED STRUCTURAL ANALYSIS MODULE)                            DTABLE    172
```

```
      CARD1(   2,MODLA) =  LA02                                         DTABLE    59
      CARD1(   4,MODLA) =  LA04                                         DTABLE    60
      CARD1(   7,MODLA) =  LA07                                         DTABLE    61
      CARD1(LAST,MODLA) =  LA00                                         DTABLE    62
      MODSA  =  2                                                       DTABLE    63
      CARD1(   1,MODSA) =  SA01                                         DTABLE    64
      CARD1(   2,MODSA) =  SA02                                         DTABLE    65
      CARD1(   3,MODSA) =  SA03                                         DTABLE    66
      CARD1(   4,MODSA) =  SA04                                         DTABLE    67
      CARD1(   5,MODSA) =  SA05                                         DTABLE    68
      CARD1(   6,MODSA) =  SA06                                         DTABLE    69
      CARD1(   7,MODSA) =  SA07                                         DTABLE    70
      CARD1(   8,MODSA) =  SA08                                         DTABLE    71
      CARD1(   9,MODSA) =  SA09                                         DTABLE    72
      CARD1(LAST,MODSA) =  SA00                                         DTABLE    73
      MODTA  =  3                                                       DTABLE    74
      CARD1(   1,MODTA) =  TA01                                         DTABLE    75
      CARD1(   2,MODTA) =  TAC1                                         DTABLE    76
      CARD1(   3,MODTA) =  TAC2                                         DTABLE    77
      CARD1(   4,MODTA) =  TAC3                                         DTABLE    78
      CARD1(   5,MODTA) =  TADG                                         DTABLE    79
      CARD1(LAST,MODTA) =  TA00                                         DTABLE    80
      MODSO  =  4                                                       DTABLE    81
      CARD1(LAST,MODSO) =  S000                                         DTABLE    82
      MODVA  =  5                                                       DTABLE    83
      CARD1(LAST,MODVA) =  VA00                                         DTABLE    84
      MODFA  =  6                                                       DTABLE    85
      CARD1(LAST,MODFA) =  FA00                                         DTABLE    86
      MODFO  =  7                                                       DTABLE    87
      CARD1(LAST,MODFO) =  F000                                         DTABLE    88
C                                                                       DTABLE    89
      GO TO 20000                                                       DTABLE    90
  400 CONTINUE                                                          DTABLE    91
C                                                                       DTABLE    92
C                                                                       DTABLE    93
      NROWS  =  1                                                       DTABLE    94
      NCOLS  =  3                                                       DTABLE    95
      KTABLE =  2                                                       DTABLE    96
      IF (CARD    .EQ. SOP) CALL PTABLE (2,31,31                        DTABLE    97
     1   HSTRUCTURAL OPTIMIZATION PACKAGE)                              DTABLE    98
      IF (CARD    .EQ. FOP) CALL PTABLE (2,28,28                        DTABLE    99
     1   HFLUTTER OPTIMIZATION PACKAGE)                                 DTABLE   100
C                                                                       DTABLE   101
      GO TO 20000                                                       DTABLE   102
  500 CONTINUE                                                          DTABLE   103
C                                                                       DTABLE   104
C                                                                       DTABLE   105
      DO 600 MOD=1,MAXMOD                                               DTABLE   106
      MODULE =  MOD                                                     DTABLE   107
      DO 600 NPA=1,MAXPAR                                               DTABLE   108
      NPART  =  NPA                                                     DTABLE   109
      IF (CARD1(NPART,MODULE) .EQ. CARD) GO TO 610                      DTABLE   110
  600 CONTINUE                                                          DTABLE   111
      GO TO 10000                                                       DTABLE   112
  610 CONTINUE                                                          DTABLE   113
      KTABLE =  YES                                                     DTABLE   114
      NROWS  =  0                                                       DTABLE   115
```

```
      C                                                                 DTABLE    2
      C45700. SUB. DTABLE (DATA TABLE OF CONTENTS)                      DTABLE    3
      C                                                                 DTABLE    4
            SUBROUTINE DTABLE (KINIT,CARD)                              DTABLE    5
      C                                                                 DTABLE    6
            INTEGER YES                                                 DTABLE    7
            REAL LAO0, LAO1, LAO2, LAO4, LAO7                           DTABLE    8
      C                                                                 DTABLE    9
            DIMENSION CARD1(10,7)                                       DTABLE   10
      C                                                                 DTABLE   11
            COMMON /CONSTS/ NO     ,YES                                 DTABLE   12
            COMMON /CTABLE/ KTABLE,NPASS ,NROWS ,NCOLS ,NCOLST,KTABLO,NPAGEA DTABLE   13
           1               ,ITAPET                                      DTABLE   14
            DATA SOP    /4HSOP /                                        DTABLE   15
            DATA FOP    /4HFOP /                                        DTABLE   16
      C                                                                 DTABLE   17
            GO TO (100, 400, 500), KINIT                                DTABLE   18
        100 CONTINUE                                                    DTABLE   19
      C                                                                 DTABLE   20
      C                                                                 DTABLE   21
      C INITIAL CONDITIONS                                              DTABLE   22
      C                                                                 DTABLE   23
            DATA BLANK  /4H    /                                        DTABLE   24
            DATA LAO0   /4HLAO0/                                        DTABLE   25
            DATA LAO1   /4HLAO1/                                        DTABLE   26
            DATA LAO2   /4HLAO2/                                        DTABLE   27
            DATA LAO4   /4HLAO4/                                        DTABLE   28
            DATA LAO7   /4HLAO7/                                        DTABLE   29
            DATA SAO0   /4HSAO0/                                        DTABLE   30
            DATA SAO1   /4HSAO1/                                        DTABLE   31
            DATA SAO2   /4HSAO2/                                        DTABLE   32
            DATA SAO3   /4HSAO3/                                        DTABLE   33
            DATA SAO4   /4HSAO4/                                        DTABLE   34
            DATA SAO5   /4HSAO5/                                        DTABLE   35
            DATA SAO6   /4HSAO6/                                        DTABLE   36
            DATA SAO7   /4HSAO7/                                        DTABLE   37
            DATA SAO8   /4HSAO8/                                        DTABLE   38
            DATA SAO9   /4HSAO9/                                        DTABLE   39
            DATA TAO0   /4HTAO0/                                        DTABLE   40
            DATA TAO1   /4HTAO1/                                        DTABLE   41
            DATA TAC1   /4HTAC1/                                        DTABLE   42
            DATA TAC2   /4HTAC2/                                        DTABLE   43
            DATA TAC3   /4HTAC3/                                        DTABLE   44
            DATA TADG   /4HTADG/                                        DTABLE   45
            DATA SO00   /4HSO00/                                        DTABLE   46
            DATA VAO0   /4HVAO0/                                        DTABLE   47
            DATA FAO0   /4HFAO0/                                        DTABLE   48
            DATA FO00   /4HFO00/                                        DTABLE   49
      C                                                                 DTABLE   50
            MAXMOD =  7                                                 DTABLE   51
            MAXPAR =  10                                                DTABLE   52
            MAX    =  MAXMOD*MAXPAR                                     DTABLE   53
            CALL DVALUE (CARD1,BLANK,MAX)                               DTABLE   54
            LAST   =  MAXPAR                                            DTABLE   55
      C                                                                 DTABLE   56
            MODLA  =  1                                                 DTABLE   57
            CARD1(    1,MODLA) =  LAO1                                  DTABLE   58
```

```
STATEMENT LABELS              DEF LINE   REFERENCES
   26  200                       27         19         21         23

COMMON BLOCKS    LENGTH      MEMBERS - BIAS NAME(LENGTH)
       CPLOTF         1               0 KPLOTF (1)

STATISTICS
  PROGRAM LENGTH                  33B        27
  CM LABELED COMMON LENGTH         1B         1
          52000B CM USED
```

```
  1          C45700. SUB. ENDP (DEFINE KPLOTF FOR ENDING PLOTS IN AFAM)         ENDP     2
             C                                                                  ENDP     3
             C     THIS ROUTINE SEARCHES THE CARD INPUT DATA TO LOCATE THE VALUE OF ENDP  4
             C     LC(14).  THEN                                                ENDP     5
  5          C     IF LC(14) = 0, KPLOTF = 1                                    ENDP     6
             C     IF LC(14) = 1, KPLOTF = 2                                    ENDP     7
             C                                                                  ENDP     8
                   SUBROUTINE ENDP (CARD)                                       ENDP     9
             C                                                                  ENDP    10
 10                DIMENSION CARD(1)                                            ENDP    11
             C                                                                  ENDP    12
                   COMMON /CPLOTF/ KPLOTF                                       ENDP    13
             C                                                                  ENDP    14
                   DATA FAOO   /4HFAOO/                                         ENDP    15
 15                DATA KSTART /2/                                              ENDP    16
                   DATA ONE    /4H   1/                                         ENDP    17
                   DATA KOUNTL /-1/                                             ENDP    18
             C                                                                  ENDP    19
                   IF (KSTART .EQ. 1) GO TO 200                                 ENDP    20
 20                IF (CARD(1) .EQ. FAOO) KOUNTL = 0                            ENDP    21
                   IF (KOUNTL .EQ.-1) GO TO 200                                 ENDP    22
                   KOUNTL =  KOUNTL + 1                                         ENDP    23
                   IF (KOUNTL .LT. 5) GO TO 200                                 ENDP    24
                   IF (CARD(5) .NE. ONE ) KPLOTF = 1                            ENDP    25
 25                IF (CARD(5) .EQ. ONE ) KPLOTF = 2                            ENDP    26
                   KSTART =  1                                                  ENDP    27
               200 CONTINUE                                                     ENDP    28
             C                                                                  ENDP    29
                   RETURN                                                       ENDP    30
 30                END                                                          ENDP    31
```

```
CARD NR. SEVERITY  DETAILS    DIAGNOSIS OF PROBLEM

   24       I       CARD      ARRAY REFERENCE OUTSIDE DIMENSION BOUNDS.
   25       I       CARD      ARRAY REFERENCE OUTSIDE DIMENSION BOUNDS.
```

```
      SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS     DEF LINE     REFERENCES
    3  ENDP          8           29

VARIABLES      SN  TYPE          RELOCATION
    0  CARD        REAL      ARRAY    F.P.      REFS     10       20       24        25   DEFINED     8
   27  FAOO        REAL                         REFS     20  DEFINED       14
   32  KOUNTL      INTEGER                      REFS     21       22       23   DEFINED        17    20    22
    0  KPLOTF      INTEGER          CPLOTF      REFS     12  DEFINED       24        25
   30  KSTART      INTEGER                      REFS     19  DEFINED       15        26
   31  ONE         REAL                         REFS     24       25  DEFINED        16
```

```
      ITAPES(31) =  11 - IOINC                                   SETUP      59
      KFILES =  1                                                SETUP      60
C                                                                SETUP      61
      MATXC1 =  0                                                SETUP      62
      MATXC2 =  0                                                SETUP      63
      MATXM1 =  0                                                SETUP      64
      MATXM2 =  0                                                SETUP      65
      MATXS1 =  0                                                SETUP      66
      MATXS2 =  0                                                SETUP      67
      MEMOUT =  0                                                SETUP      68
      NTAPLT =  0                                                SETUP      69
      DO 30 J=1,MPOS                                             SETUP      70
      IPOS(J) = 1                                                SETUP      71
   30 CONTINUE                                                   SETUP      72
      JDSRN = 1                                                  SETUP      73
      ISCR = 2                                                   SETUP      74
      JSCR = 3                                                   SETUP      75
      MDSRN = 4                                                  SETUP      76
      NDSRN  =  8  - IOINC                                       SETUP      77
      LDSRN  =  9  - IOINC                                       SETUP      78
      IDSRN  =  10 - IOINC                                       SETUP      79
      KSCR   =  11 - IOINC                                       SETUP      80
      LSCR   =  12 - IOINC                                       SETUP      81
      MSCR   =  13 - IOINC                                       SETUP      82
      NSCR   =  14 - IOINC                                       SETUP      83
      NTAPC = JDSRN                                              SETUP      84
      IFILC = 1                                                  SETUP      85
      NTAPBC = JDSRN                                             SETUP      86
      IFILBC = 2                                                 SETUP      87
      NTAPL = JDSRN                                              SETUP      88
      IFILL = 3                                                  SETUP      89
      NTAPM = JDSRN                                              SETUP      90
      IFILM = 4                                                  SETUP      91
      NTAPK = MDSRN                                              SETUP      92
      IFILK = 1                                                  SETUP      93
      NTAPDD = MDSRN                                             SETUP      94
      IFILDD = 1                                                 SETUP      95
      NTAPIS = IDSRN                                             SETUP      96
      IFILIS = 3                                                 SETUP      97
      NTAPST = NDSRN                                             SETUP      98
      IFILST = 1                                                 SETUP      99
      NTAPES = LDSRN                                             SETUP     100
      NTAPD = IDSRN                                              SETUP     101
      IFILD = 2                                                  SETUP     102
      IFILLT = 1                                                 SETUP     103
      NTAPDC = LDSRN                                             SETUP     104
      IFILDC = 0                                                 SETUP     105
      NTAPS = LDSRN                                              SETUP     106
      NTAPT = NDSRN                                              SETUP     107
      IFILT = 2                                                  SETUP     108
      LMT = JDSRN+NDSRN                                          SETUP     109
      LMF = IFILM+2                                              SETUP     110
      NTTSDL=KSCR                                                SETUP     111
      IFTSDL =  1                                                SETUP     112
      NTAKDI=LSCR                                                SETUP     113
      IFIKDI =  1                                                SETUP     114
      NTTRAN=MSCR                                                SETUP     115
```

```
      IFTRAN = 0                                                        SETUP     116
      IF (JATRAN .GT. 0) IFTRAN = IFTRAN + 1                            SETUP     117
      IF (JWTRAN .GT. 0) IFTRAN = IFTRAN + 1                            SETUP     118
      IF (JDTRAN .GT. 0) IFTRAN = IFTRAN + 1                            SETUP     119
      NTAERO=14                                                         SETUP     120
      IFAERO=15                                                         SETUP     121
C                                                                       SETUP     122
C                                                                       SETUP     123
C TRANSFER BASIC INFORMATION TO THE GENERAL VARIABLES                   SETUP     124
C                                                                       SETUP     125
      ISETUP( 1) =  MATXC1                                              SETUP     126
      ISETUP( 2) =  MATXC2                                              SETUP     127
      ISETUP( 3) =  NTAPC                                               SETUP     128
      ISETUP( 4) =  IFILC                                               SETUP     129
      ISETUP( 5) =  NTAPBC                                              SETUP     130
      ISETUP( 6) =  IFILBC                                              SETUP     131
      ISETUP( 7) =  NTAPL                                               SETUP     132
      ISETUP( 8) =  IFILL                                               SETUP     133
      ISETUP( 9) =  MATXM1                                              SETUP     134
      ISETUP(10) =  MATXM2                                              SETUP     135
      ISETUP(11) =  NTAPM                                               SETUP     136
      ISETUP(12) =  IFILM                                               SETUP     137
      ISETUP(13) =  NTAPK                                               SETUP     138
      ISETUP(14) =  IFILK                                               SETUP     139
      ISETUP(15) =  NTAPDD                                              SETUP     140
      ISETUP(16) =  IFILDD                                              SETUP     141
      ISETUP(17) =  NTAPST                                              SETUP     142
      ISETUP(18) =  IFILST                                              SETUP     143
      ISETUP(19) =  NTAPES                                              SETUP     144
      ISETUP(20) =  IFILFS                                              SETUP     145
      ISETUP(21) =  NTAPD                                               SETUP     146
      ISETUP(22) =  IFILD                                               SETUP     147
      ISETUP(23) =  NTAPDC                                              SETUP     148
      ISETUP(24) =  IFILDC                                              SETUP     149
      ISETUP(25) =  MATXS1                                              SETUP     150
      ISETUP(26) =  MATXS2                                              SETUP     151
      ISETUP(27) =  NTAPS                                               SETUP     152
      ISETUP(28) =  IFILS                                               SETUP     153
      ISETUP(29) =  MEMOUT                                              SETUP     154
      ISETUP(30) =  NTAPT                                               SETUP     155
      ISETUP(31) =  IFILT                                               SETUP     156
      ISETUP(32) =  NTAPLT                                              SETUP     157
      ISETUP(33) =  IFILLT                                              SETUP     158
      ISETUP(34) =  IS12                                                SETUP     159
      ISETUP(35) =  KOR                                                 SETUP     160
      ISETUP(36) =  NTAPIS                                              SETUP     161
      ISETUP(37) =  IFILIS                                              SETUP     162
      ISETUP(38) =  NTTSDL                                              SETUP     163
      ISETUP(39) =  IFTSDL                                              SETUP     164
      ISETUP(40) =  NTAKDI                                              SETUP     165
      ISETUP(41) =  IFIKDI                                              SETUP     166
      ISETUP(42) =  NTTRAN                                              SETUP     167
      ISETUP(43) =  IFTRAN                                              SETUP     168
      ISETUP(44) =  NTAERO                                              SETUP     169
      ISETUP(45) =  IFAERO                                              SETUP     170
      JSETUP( 1) =  JDSRN                                               SETUP     171
      JSETUP( 2) =  KDSRN                                               SETUP     172
```

```
              JSETUP( 3) =  LDSRN                                            SETUP      173
              JSETUP( 4) =  MDSRN                                            SETUP      174
              JSETUP( 5) =  NDSRN                                            SETUP      175
              JSETUP( 6) =  IDSRN                                            SETUP      176
              JSETUP( 7) =  ISCR                                             SETUP      177
              JSETUP( 8) =  JSCR                                             SETUP      178
              JSETUP( 9) =  KSCR                                             SETUP      179
              JSETUP(10) =  LSCR                                             SETUP      180
              JSETUP(11) =  MSCR                                             SETUP      181
              JSETUP(12) =  NSCR                                             SETUP      182
              JSETUP(13) =  ISC                                              SETUP      183
              RETURN                                                         SETUP      184
              END                                                            SETUP      185
```

```
    SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS     DEF LINE     REFERENCES
    3  SETUP        31          183

VARIABLES     SN  TYPE            RELOCATION
  244  I          INTEGER                          REFS      53     2*54  DEFINED      52
  264  IDSRN      INTEGER                          REFS      95      100      175  DEFINED      78
  334  IFAERO     INTEGER                          REFS     169  DEFINED      120
  325  IFIKDI     INTEGER                          REFS     165  DEFINED      113
  274  IFILBC     INTEGER                          REFS     130  DEFINED       86
  272  IFILC      INTEGER                          REFS     128  DEFINED       84
  313  IFILD      INTEGER                          REFS     146  DEFINED      101
  316  IFILDC     INTEGER                          REFS     148  DEFINED      104
  304  IFILDD     INTEGER                          REFS     140  DEFINED       94
    1  IFILES     INTEGER   ARRAY    CFILES        REFS      34       41  DEFINED      53
  335  IFILFS   * INTEGER  *UNDEF                  REFS     144
  306  .FILIS     INTEGER                          REFS     161  DEFINED       96
  302  IFILK      INTEGER                          REFS     138  DEFINED       92
  276  IFILL      INTEGER                          REFS     132  DEFINED       88
  314  IFILLT     INTEGER                          REFS     157  DEFINED      102
  300  IFILM      INTEGER                          REFS     109      136  DEFINED      90
  336  IFILS    * INTEGER  *UNDEF                  REFS     152
  310  IFILST     INTEGER                          REFS     142  DEFINED       98
  321  IFILT      INTEGER                          REFS     155  DEFINED      107
  327  IFTRAN     INTEGER                          REFS     116      117      118      167  DEFINED      115      116
                                                    117     118
  323  IFTSDL     INTEGER                          REFS     163  DEFINED      111
    0  IOINC      INTEGER            CSETUP        REFS      40       57       58       76       77       78       79
                                                     80      81       82
    0  IPOS       INTEGER   ARRAY    FILE          REFS      34       37       50  DEFINED      70
  342  ISC      * INTEGER  *UNDEF                  REFS     182
  257  ISCR       INTEGER                          REFS     176  DEFINED       73
    0  ISETUP     INTEGER   ARRAY    MATRIX        REFS      34       38  DEFINED      125      126      127      128
                                                    129     130      131      132      133      134      135      136
                                                    137     138      139      140      141      142      143      144
                                                    145     146      147      148      149      150      151      152
                                                    153     154      155      156      157      158      159      160
                                                    161     162      163      164      165      166      167      168
```

```
VARIABLES      SN  TYPE           RELOCATION
                                              169
 337  IS12    * INTEGER   *UNDEF              REFS      158
   0  ITAPES    INTEGER    ARRAY    CTAPES    REFS       34        42        49   DEFINED      54        55        56
                                               57        58
 255  J         INTEGER                       REFS       70   DEFINED        69
 330  JATRAN  * INTEGER   *UNDE               REFS      116
 256  JDSRN     INTEGER                       RE S       83        85        87        89       108       170
                                            DEFINED      72
 332  JDTRAN  * INTEGER   *UNDEF              REFS      118
 260  JSCR      INTEGER                       REFS      177   DEFINED        74
   0  JSETUP    INTEGER    ARRAY    DSRN      REFS       34        36   DEFINED       170       171       172       173
                                              174       175       176       177       178       179       180       181
                                              182
 331  JWTRAN  * INTEGER   *UNDEF              REFS      117
 341  KDSRN   * INTEGER   *UNDEF              REFS      171
   0  KFILES    INTEGER             CFILES    REFS       41   DEFINED        59
   0  KINIT     INTEGER              F.P.     REFS       48   DEFINED        31
 340  KOR     * INTEGER   *UNDEF              REFS      159
 265  KSCR      INTEGER                       REFS      110       178   DEFINED        79
   3  LDF       INTEGER             SUM       REFS       39
 263  LDSRN     INTEGER                       REFS       99       103       105       172   DEFINED        77
   2  LDT       INTEGER             SUM       REFS       39
   5  LMF       INTEGER             SUM       REFS       39   DEFINED       109
   4  LMT       INTEGER             SUM       REFS       39   DEFINED       108
 266  LSCR      INTEGER                       REFS      112       179   DEFINED        80
   1  LSF       INTEGER             SUM       REFS       39
   0  LST       INTEGER             SUM       REFS       39
 245  MATXC1    INTEGER                       REFS      125   DEFINED        61
 246  MATXC2    INTEGER                       REFS      126   DEFINED        62
 247  MATXM1    INTEGER                       REFS      133   DEFINED        63
 250  MATXM2    INTEGER                       REFS      134   DEFINED        64
 251  MATXS1    INTEGER                       REFS      149   DEFINED        65
 252  MATXS2    INTEGER                       REFS      150   DEFINED        66
 261  MDSRN     INTEGER                       REFS       91        93       173   DEFINED        75
 253  MEMOUT    INTEGER                       REFS      153   DEFINED        67
 243  MPOS      INTEGER                       REFS       69   DEFINED        50
 267  MSCR      INTEGER                       REFS      114       180   DEFINED        81
 242  MTAPES    INTEGER                       REFS       52   DEFINED        49
 262  NDSRN     INTEGER                       REFS       97       106       108       174   DEFINED        76
 270  NSCR      INTEGER                       REFS      181   DEFINED        82
 333  NTAERO    INTEGER                       REFS      168   DEFINED       119
 324  NTAKDI    INTEGER                       REFS      164   DEFINED       112
 273  NTAPBC    INTEGER                       REFS      129   DEFINED        85
 271  NTAPC     INTEGER                       REFS      127   DEFINED        83
 312  NTAPD     INTEGER                       REFS      145   DEFINED       100
 315  NTAPDC    INTEGER                       REFS      147   DEFINED       103
 303  NTAPDD    INTEGER                       REFS      139   DEFINED        93
 311  NTAPES    INTEGER                       REFS      143   DEFINED        99
 305  NTAPIS    INTEGER                       REFS      160   DEFINED        95
 301  NTAPK     INTEGER                       REFS      137   DEFINED        91
 275  NTAPL     INTEGER                       REFS      131   DEFINED        87
 254  NTAPLT    INTEGER                       REFS      156   DEFINED        68
 277  NTAPM     INTEGER                       REFS      135   DEFINED        89
 317  NTAPS     INTEGER                       REFS      151   DEFINED       105
 307  NTAPST    INTEGER                       REFS      141   DEFINED        97
 320  NTAPT     INTEGER                       REFS      154   DEFINED       106
 326  NTTRAN    INTEGER                       REFS      166   DEFINED       114
```

```
VARIABLES     SN  TYPE           RELOCATION
  322  NTTSDL     INTEGER                           REFS       162    DEFINED      110

STATEMENT LABELS               DEF LINE   REFERENCES
    0  30                          71          69
   12  100                         51          48
    0  130                         54          52

LOOPS  LABEL     INDEX      FROM-TO     LENGTH     PROPERTIES
   15  130       I           52 54          3B      INSTACK
   36  30        J           69 71          2B      INSTACK

COMMON BLOCKS   LENGTH     MEMBERS - BIAS NAME(LENGTH)
       DSRN         25               0 JSETUP (25)
       FILE         20               0 IPOS   (20)
       MATRIX       45               0 ISETUP (45)
       SUM           6               0 LST    (1)         1 LSF    (1)           2 LDT    (1)
                                     3 LDF    (1)         4 LMT    (1)           5 LMF    (1)
       CSETUP        1               0 IDINC  (1)
       CFILES       51               0 KFILES (1)         1 IFILES (50)
       CTAPES       50               0 ITAPES (50)

STATISTICS
  PROGRAM LENGTH                 343B      227
  CM LABELED COMMON LENGTH       306B      198
        52000B CM USED
```

```
      C45700, SUB. LTABLE (LIST TABLE OF CONTENTS)                            LTABLE    2
      C                                                                       LTABLE    3
            SUBROUTINE LTABLE (ITAPEW,KROUPD)                                 LTABLE    4
      C                                                                       LTABLE    5
            INTEGER WIDTHA                                                    LTABLE    6
      C                                                                       LTABLE    7
      C                                                                       LTABLE    8
      CIBM  BEGINNING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS     LTABLE    9
      C     DOUBLE PRECISION DUMMY1,DUMMY2,DUMMY3                             LTABLE   10
      CIBM  ENDING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS        LTABLE   11
      C                                                                       LTABLE   12
            DIMENSION CPAR(2)           ,CHAR(15)                             LTABLE   13
            DIMENSION EQU(100)                                                LTABLE   14
            DIMENSION FMT(10)           ,FNUM(15)                             LTABLE   15
            DIMENSION  TEXT(18)         ,TMH(18,2)                            LTABLE   16
            DIMENSION XN(2)                                                   LTABLE   17
      C                                                                       LTABLE   18
            COMMON /CLIST / KOUNT ,KPAGE ,LINES ,LINEST,KLABEL,KTPAGE,NPAGE   LTABLE   19
           1               ,KBPAGE,LINESG,KOUNTH,KOUNTI                       LTABLE   20
            COMMON /CTITLE/ LDUMMY,TEXT                                       LTABLE   21
            COMMON /COMPUT/ KOMPUT,NCHARW                                     LTABLE   22
            COMMON /CTABLE/ KTABLE,NPASSD,NROWSD,NCOLSD, NCOLST,KTABLO,NPAGEA LTABLE   23
           1                ,ITAPET                                           LTABLE   24
            COMMON /CTMH  / KTMH  ,LTMH  ,TMH                                 LTABLE   25
            COMMON /CONSTS/ NO    ,YES                                        LTABLE   26
      C                                                                       LTABLE   27
            EQUIVALENCE (EQU(1),KROUP ), (EQU(2),KLAST ), (EQU(3),NCHAR )     LTABLE   28
           1           ,(EQU(4),NPASS), (EQU(5),NROWS ), (EQU(6),NCOLS )      LTABLE   29
           2           ,(EQU(7),NPAGET),(EQU(8),NWORDS), (EQU(9),CHAR(1))     LTABLE   30
      C                                                                       LTABLE   31
            IF (KTABLO .EQ. 1) GO TO 900                                      LTABLE   32
      C                                                                       LTABLE   33
      C                                                                       LTABLE   34
      C INITIAL CONDITIONS                                                    LTABLE   35
      C                                                                       LTABLE   36
            DATA BLANK /1H /                                                  LTABLE   37
      C                                                                       LTABLE   38
      CIBM  BEGINNING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS     LTABLE   39
      C     DATA DOTS   /4H..../                                              LTABLE   40
      CIBM  ENDING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS        LTABLE   41
      C                                                                       LTABLE   42
      CCDC  BEGINNING OF STATEMENTS ASSOCIATED WITH CDC COMPUTER PROGRAMS     LTABLE   43
            DATA DOTS   /10H........../                                       LTABLE   44
      CCDC  ENDING OF STATEMENTS ASSOCIATED WITH CDC COMPUTER PROGRAMS        LTABLE   45
      C                                                                       LTABLE   46
            DATA OPAR   /4H(9X,/                                              LTABLE   47
            DATA X      /4HX,  /                                              LTABLE   48
            DATA A      /4HA   /                                              LTABLE   49
            DATA C1A    /4H,1A /                                              LTABLE   50
            DATA XN     /4H,12X,4H,2X,/                                       LTABLE   51
            DATA CPAR   /4H   ),4H2I5)/                                       LTABLE   52
            DATA FNUM   /2H 1,2H 2,2H 3,2H 4,2H 5,2H 6,2H 7,2H 8,2H 9,2H10    LTABLE   53
           1            ,2H11,2H12,2H13,2H14,2H15/                            LTABLE   54
            KROUP  =  KROUPD                                                  LTABLE   55
            IF (KROUP.EQ.0)   GOTO 50                                         LTABLE   56
            KROUP  =  0                                                       LTABLE   57
            NWORDS =  15                                                      LTABLE   58
```

```
      MAXV   =  NWORDS + 8                                          LTABLE    59
      WRITE (ITAPET) MAXV, KROUP, KLAST, NCHAR, NPASS, NROWS, NCOLS LTABLE    60
     1             ,NPAGE, NWORDS, (CHAR(N), N=1,NWORDS)            LTABLE    61
     2             ,DUMMY1,DUMMY2,DUMMY3                            LTABLE    62
   50 CONTINUE                                                      LTABLE    63
      REWIND ITAPET                                                 LTABLE    64
      KOUNT  =  LINES                                               LTABLE    65
C                                                                   LTABLE    66
C                                                                   LTABLE    67
C LIST TABELE OF CONTENTS                                           LTABLE    68
C                                                                   LTABLE    69
  100 CONTINUE                                                      LTABLE    70
      READ (ITAPET) MAXV, (EQU(IE), IE=1,MAXV),DUMMY1,DUMMY2,DUMMY3 LTABLE    71
      IF (KROUP .EQ. 0) GO TO 900                                   LTABLE    72
      IF (KROUP .NE. 1) GO TO 100                                   LTABLE    73
      LTEXT  =  18                                                  LTABLE    74
      DO 150 L=1,LTEXT                                              LTABLE    75
      IF (KLAST .EQ. 1) TEXT(L) =  BLANK                            LTABLE    76
      IF (KLAST .EQ. 2) TEXT(L) =  DOTS                             LTABLE    77
  150 CONTINUE                                                      LTABLE    78
      DO 170 L=1,NWORDS                                             LTABLE    79
  170 TEXT(L)=  CHAR(L)                                             LTABLE    80
      KOEFA  =  (NCOLST - NCOLS)/NCHARW                             LTABLE    81
      WIDTHA =  (NCOLST - NCOLS) - KOEFA*NCHARW                     LTABLE    82
      KOEFX  =  1 + NCOLS                                           LTABLE    83
      LTEXT  =  KOEFA                                               LTABLE    84
      FMT( 1)=  OPAR                                                LTABLE    85
      FMT( 2)=  FNUM(KOEFX)                                         LTABLE    86
      FMT( 3)=  X                                                   LTABLE    87
      FMT( 4)=  FNUM(KOEFA)                                         LTABLE    88
      FMT( 5)=  A                                                   LTABLE    89
      FMT( 6)=  FNUM(NCHARW)                                        LTABLE    90
      FMT( 7)=  BLANK                                               LTABLE    91
      FMT( 8)=  BLANK                                               LTABLE    92
      IF (WIDTHA .EQ. 0) GO TO 175                                  LTABLE    93
      LTEXT  =  LTEXT + 1                                           LTABLE    94
      FMT( 7)= C1A                                                  LTABLE    95
      FMT( 8)=  FNUM(WIDTHA)                                        LTABLE    96
  175 CONTINUE                                                      LTABLE    97
      FMT( 9)=  XN(KLAST)                                           LTABLE    98
      FMT(10)=  CPAR(KLAST)                                         LTABLE    99
      KOUNT  =  KOUNT + NROWS                                       LTABLE   100
      CALL TITLES (1)                                               LTABLE   101
      IF (KOUNT .GT. 3*(KTMH-NO)) GO TO 180                         LTABLE   102
      WRITE (ITAPEW,1000)                                           LTABLE   103
      NROWS  =  2                                                   LTABLE   104
      KOUNT  =  KOUNT + NROWS + 1                                   LTABLE   105
  180 KOUNT  =  KOUNT + 1                                           LTABLE   106
      CALL PLB (1,NROWS,ITAPEW)                                     LTABLE   107
      GO TO (200, 300), KLAST                                       LTABLE   108
  200 WRITE (ITAPEW,FMT ) (TEXT(L), L=1,LTEXT)                      LTABLE   109
      GO TO 400                                                     LTABLE   110
  300 WRITE (ITAPEW,FMT ) (TEXT(L), L=1,LTEXT),NPASS,NPAGET         LTABLE   111
  400 CONTINUE                                                      LTABLE   112
      GO TO 100                                                     LTABLE   113
  900 CONTINUE                                                      LTABLE   114
      KROUPD =  KROUP                                               LTABLE   115
```

```
  115          C                                                          LTABLE     116
               C                                                          LTABLE     117
               C FORMATS                                                  LTABLE     118
               C                                                          LTABLE     119
                1000 FORMAT (10X, 20(1H*),19H TABLE OF CONTENTS ,21(1H*), 2X,   LTABLE     120
  120              1       ,10H PASS PAGE)                                LTABLE     121
               C                                                          LTABLE     122
                     RETURN                                               LTABLE     123
                     END                                                  LTABLE     124
```

```
CARD NR. SEVERITY  DETAILS    DIAGNOSIS OF PROBLEM

   107     I                AN IF STATEMENT MAY BE MORE EFFICIENT THAN A 2 OR 3 BRANCH COMPUTED GO TO STATEMENT.
```

```
        SYMBOLIC REFERENCE MAP (R=3)

 ENTRY POINTS      DEF LINE      REFERENCES
     3  LTABLE          3          122

 VARIABLES     SN  TYPE            RELOCATION
   174  A          REAL                              REFS        88    DEFINED      48
   170  BLANK      REAL                              REFS        75       90        91    DEFINED       36
   277  CHAR       REAL        ARRAY                 REFS        12       27        59       79
   433  CPAR       REAL        ARRAY                 REFS        12       98   DEFINED       51
   175  C1A        REAL                              REFS        94    DEFINED      49
   171  DOTS       REAL                              REFS        76    DEFINED      43
   257  DUMMY1     REAL                              REFS        59    DEFINED      70
   260  DUMMY2     REAL                              REFS        59    DEFINED      70
   261  DUMMY3     REAL                              REFS        59    DEFINED      70
   267  EQU        REAL        ARRAY                 REFS        13     9*27   DEFINED       70
   435  FMT        REAL        ARRAY                 REFS        14      108       110   DEFINED       84        85        86
                                                       87        88       89        90       91        94        95        97
                                                       98
   447  FNUM       REAL        ARRAY                 REFS        14       85        87       89        95
                                                  DEFINED        52
   262  IE         INTEGER                           REFS        70    DEFINED      70
     7  ITAPET     INTEGER              CTABLE       REFS        22    I/O REFS     59       63        70
     0  ITAPEW     INTEGER              F.P.         REFS       106    DEFINED       3   I/O REFS     102       108       110
     7  KBPAGE     INTEGER              CLIST        REFS        18
     4  KLABEL     INTEGER              CLIST        REFS        18
   270  KLAST      INTEGER                           REFS        27       59        75       76        97        98       107
   265  KOEFA      INTEGER                           REFS        81       83        87   DEFINED       80
   266  KOEFX      INTEGER                           REFS        85    DEFINED      82
     0  KOMPUT     INTEGER              COMPUT       REFS        21
     0  KOUNT      INTEGER              CLIST        REFS        18       99       101      104       105
                                                  DEFINED        64       99       104      105
    11  KOUNTH     INTEGER              CLIST        REFS        18
    12  KOUNTI     INTEGER              CLIST        REFS        18
     1  KPAGE      INTEGER              CLIST        REFS        18
```

```
VARIABLES      SN  TYPE            RELOCATION
                                               DEFINED      54       56
     0  KROUPD    INTEGER             F.P.       REFS       54    DEFINED        3       114
     0  KTABLE    INTEGER            CTABLE      REFS       22
     5  KTABLO    INTEGER            CTABLE      REFS       22       31
     0  KTMH      INTEGER            CTMH        REFS       24      101
     5  KTPAGE    INTEGER            CLIST       REFS       18
   264  L         INTEGER                        REFS       75       76      2*79      108       110
                                               DEFINED      74       78       108      110
     0  LDUMMY    INTEGER            CTITLE      REFS       20
     2  LINES     INTEGER            CLIST       REFS       18       64
    10  LINESG    INTEGER            CLIST       REFS       18
     3  LINEST    INTEGER            CLIST       REFS       18
   263  LTEXT     INTEGER                        REFS       74       93       108      110    DEFINED       73       83
                                                  93
     1  LTMH      INTEGER            CTMH        REFS       24
   255  MAXV      INTEGER                        REFS       59       70    DEFINED       58        70
   256  N         INTEGER                        REFS       59    DEFINED       59
   271  NCHAR     INTEGER                        REFS       27       59
     1  NCHARW    INTEGER            COMPUT      REFS       21       80        81       89
   274  NCOLS     INTEGER                        REFS       27       59        80       81        82
     3  NCOLSD    INTEGER            CTABLE      REFS       22
     4  NCOLST    INTEGER            CTABLE      REFS       22       80        81
     0  NO        INTEGER            CONSTS      REFS       25      101
     6  NPAGE     INTEGER            CLIST       REFS       18       59
     6  NPAGEA    INTEGER            CTABLE      REFS       22
   275  NPAGET    INTEGER                        REFS       27      110
   272  NPASS     INTEGER                        REFS       27       59       110
     1  NPASSD    INTEGER            CTABLE      REFS       22
   273  NROWS     INTEGER                        REFS       27       59        99      104       106
                                               DEFINED     103
     2  NROWSD    INTEGER            CTABLE      REFS       22
   276  NWORDS    INTEGER                        REFS       27       58      2*59       78    DEFINED       57
   172  OPAR      REAL                           REFS       84    DEFINED       46
     1  TEXT      REAL       ARRAY   CTITLE      REFS       15       20       108      110    DEFINED       75       76
                                                  79
     2  TMH       REAL       ARRAY   CTMH        REFS       15       24
   254  WIDTHA    INTEGER                        REFS        5       92        95   DEFINED        81
   173  X         REAL                           REFS       86    DEFINED       47
   466  XN        REAL       ARRAY               REFS       16       97    DEFINED       50
     1  YES       REAL               CONSTS      REFS       25
        VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS           TYPE    ARGS         REFERENCES
        PLB                   3              106
        TITLES                1              100

STATEMENT LABELS            DEF LINE    REFERENCES
    20  50                      62          55
    24  100                     69          72        112
     0  150                     77          74
     0  170                     79          78
   110  175                     96          92
   127  180                    105         101
   142  200                    108         107
   150  300                    110         107
   155  400                    111         109
   156  900                    113          31         71
```

```
STATEMENT LABELS                DEF LINE   REFERENCES
  244   1000    FMT               119         102

LOOPS  LABEL     INDEX      FROM-TO     LENGTH      PROPERTIES
   45  150       L           74 77         5B        INSTACK
   56  170       L           78 79         3B        INSTACK

COMMON BLOCKS    LENGTH     MEMBERS - BIAS NAME(LENGTH)
       CLIST          11                 0 KOUNT   (1)               1 KPAGE  (1)               2 LINES  (1)
                                         3 LINEST  (1)               4 KLABEL (1)               5 KTPAGE (1)
                                         6 NPAGE   (1)               7 KBPAGE (1)               8 LINESG (1)
                                         9 KOUNTH  (1)              10 KOUNTI (1)
       CTITLE         19                 0 LDUMMY  (1)               1 TEXT   (18)
       COMPUT          2                 0 KOMPUT  (1)               1 NCHARW (1)
       CTABLE          8                 0 KTABLE  (1)               1 NPASSD (1)               2 NROWSD (1)
                                         3 NCOLSD  (1)               4 NCOLST (1)               5 KTABLO (1)
                                         6 NPAGEA  (1)               7 ITAPET (1)
       CTMH           38                 0 KTMH    (1)               1 LTMH   (1)               2 TMH    (36)
       CONSTS          2                 0 NO      (1)               1 YES    (1)

EQUIV CLASSES    LENGTH     MEMBERS - BIAS NAME(LENGTH)
       EQU           100                 0 KROUP   (1)               1 KLAST  (1)               2 NCHAR  (1)
                                         3 NPASS   (1)               4 NROWS  (1)               5 NCOLS  (1)
                                         6 NPAGET  (1)               7 NWORDS (1)               8 CHAR   (15)

STATISTICS
  PROGRAM LENGTH                    470B      312
  CM LABELED COMMON LENGTH          120B       80
          52000B CM USED
```

```
C45700, SUB. LLABEL (LIST TABLE FOR INPUT-OUTPUT LABELS)                 LLABEL     2
C                                                                        LLABEL     3
C*********************************************************************** LLABEL     4
C                                                                      * LLABEL     5
C***  SUBROUTINE LLABEL  *********************************************** LLABEL     6
C                                                                      * LLABEL     7
C***  COMPUTER VERSION  ************************************************ LLABEL     8
C     ----------------                                                 * LLABEL     9
C     IBM COMPUTER PROGRAM VERSION                                     * LLABEL    10
C                                                                      * LLABEL    11
C     FORTRAN STATEMENTS CONTAINED WITHIN THE TWO CARDS IDENTIFIED     * LLABEL    12
C     BY CIBM IN COLUMNS ONE TO FOUR ARE ASSOCIATED WITH THE IBM       * LLABEL    13
C     COMPUTER AND SHOULD BE LEFT BLANK.                               * LLABEL    14
C                                                                      * LLABEL    15
C     CDC COMPUTER PROGRAM VERSION                                     * LLABEL    16
C                                                                      * LLABEL    17
C     FORTRAN STATEMENTS CONTAINED WITHIN THE TWO CARDS IDENTIFIED     * LLABEL    18
C     BY CIBM IN COLUMNS ONE TO FOUR ARE ASSOCIATED WITH THE IBM       * LLABEL    19
C     CCMPUTER AND SHOULD HAVE A C IN COLUMN ONE.                      * LLABEL    20
C                                                                      * LLABEL    21
C*********************************************************************** LLABEL    22
C                                                                        LLABEL    23
      SUBROUTINE LLABEL (ITAPEW,KROUPD,KBLAB)                            LLABEL    24
C                                                                        LLABEL    25
CIBM  BEGINNING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS      LLABEL    26
C     DOUBLE PRECISION PNAME ,CNAME ,UNITNA                              LLABEL    27
CIBM  ENDING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS         LLABEL    28
C                                                                        LLABEL    29
      DIMENSION IOS(100)          ,IOSUM(100)                            LLABEL    30
      DIMENSION EQU(100)                                                 LLABEL    31
      DIMENSION FILENA(2)                                                LLABEL    32
      DIMENSION TMH(18,2)                                                LLABEL    33
C                                                                        LLABEL    34
      COMMON /CLIST / KOUNT ,KPAGE ,LINES ,LINEST,KLABEL,KTPAGE,NPAGE    LLABEL    35
     1               ,KBPAGE,LINESG,KOUNTH,KOUNTI                        LLABEL    36
      COMMON /LABELS/ KFLABO,KDLABO,KFLABI,KDLABI,ITAPEL                 LLABEL    37
      COMMON /CTMH  / KTMH  ,LTMH  ,TMH                                  LLABEL    38
      COMMON /CONSTS/ NO    ,YES                                         LLABEL    39
C                                                                        LLABEL    40
      EQUIVALENCE (EQU(1),KROUP ), (EQU(2),NTAPE ), (EQU(3), FILENA(1))  LLABEL    41
     1            ,(EQU(5),NFILE), (EQU(6),IROWS ), (EQU(7),JCOLS )      LLABEL    42
     2            ,(EQU(8),NPAGET), (EQU(9),TSIO)                        LLABEL    43
C                                                                        LLABEL    44
      IF (KFLABO .EQ. 1 .AND. KDLABO .EQ. 1) GO TO 950                   LLABEL    45
C                                                                        LLABEL    46
C                                                                        LLABEL    47
C INITIAL CONDITIONS                                                     LLABEL    48
C                                                                        LLABEL    49
      DATA FSIO   /4HFSIO/                                               LLABEL    50
      DATA DSIO   /4HDSIO/                                               LLABEL    51
      KLABT  =  (KFLABI-1) + (KDLABI-1)                                  LLABEL    52
      KROUP  =  KROUPD                                                   LLABEL    53
      NIOS   =  100                                                      LLABEL    54
      DO 40 IO=1,NIOS                                                    LLABEL    55
      IOSUM(IO) = 0                                                      LLABEL    56
   40 IOS(IO)=  0                                                        LLABEL    57
      IF (KROUP.EQ.0)   GOTO 50                                          LLABEL    58
```

```
      KROUP  =  0
      MAXV   =  9
      WRITE (ITAPEL) MAXV,KROUP,NTAPE,FILENA,NFILE,IROWS,JCOLS,NPAGE
     1                 ,TSIO,PNAME,CNAME,UNITNA
   50 CONTINUE
C
C
C LIST INPUT-OUTPUT MATRIX LABELS AS GENERATED WITHIN THE PROGRAM
C
      KLAB   =  0
   75 CONTINUE
      KLAB   =  KLAB + 1
      REWIND ITAPEL
      KOUNT  =  LINES
  100 CONTINUE
      READ (ITAPEL) MAXV, (EQU(IE), IE=1,MAXV),PNAME,CNAME,UNITNA
      IF (KROUP .EQ. 0) GO TO 200
      IF (KROUP .NE. 2) GO TO 100
      IF (KBLAB  .EQ. 2) GO TO 150
      IF (KLAB  .GT. 1) GO TO 110
      IF (KFLABI .EQ. 1) GO TO 110
      IF (KLAB .EQ. 1     .AND. TSIO .EQ. FSIO) GO TO 150
      GO TO 100
  110 CONTINUE
      IF (KDLABI .EQ. 1) GO TO 230
      IF (KLAB .EQ. KLABT .AND. TSIO .EQ. DSIO) GO TO 150
      GO TO 100
  150 CONTINUE
      IOS(NTAPE) = NTAPE
      IOSUM(NTAPE) = IOSUM(NTAPE) + 1
      CALL TITLES (1)
      IF (KOUNT .GT. 3*(KTMH-NO)) GO TO 180
      WRITE (ITAPEW,1000)
      CALL PLB (1,1,ITAPEW)
      WRITE (ITAPEW,1100)
      CALL PLB (1,1,ITAPEW)
      KOUNT  =  KOUNT + 5
  180 KOUNT  =  KOUNT + 1
      WRITE (ITAPEW,1200) PNAME,CNAME,UNITNA,FILENA,NTAPE,NFILE
     1                      ,IROWS,JCOLS,NPAGET
      GO TO 100
  200 CONTINUE
C
      IF (KBLAB .EQ. 2) GO TO 230
      IF (KLAB .LT. KLABT) GO TO 75
  230 CONTINUE
C
C
C LIST INPUT-OUTPUT MATRIX LABELS IN NUMERICAL ORDER OF I/O UNITS
C
      KOUNT  =  LINES
      DO 450 IO=1,NIOS
      IF (IOSUM(IO) .EQ. 0) GO TO 450
      KLAB   =  0
  275 CONTINUE
      KLAB   =  KLAB + 1
```

```
  300 CONTINUE                                                          LLABEL     116
      IF (IOSUM(IO)  EQ. O) GO TO 450                                   LLABEL     117
      READ (ITAPEL) MAXV, (EQU(IE), IE=1,MAXV),PNAME,CNAME.UNITNA       LLABEL     118
      IF '(KROUP .EQ  O) GO TO 400                                      LLABEL     119
      IF (KROUP .NE  2) GO TO 300                                       LLABEL     120
      IF (KBLAB  .EQ. 2) GO TO 350                                      LLABEL     121
      IF (KLAB  .GT. 1) GO TO 310                                       LLABEL     122
      IF (KFLABI .EQ. 1) GO TO 310                                      LLABEL     123
      IF (KLAB .EQ. 1      .AND. TSIO .EQ. FSIO) GO TO 350              LLABEL     124
      GO TO 300                                                         LLABEL     125
  310 CONTINUE                                                          LLABEL     126
      IF (KDLABI .EQ. 1) GO TO 430                                      LLABEL     127
      IF (KLAB .EQ. KLABT .AND. TSIO .EQ. DSIO) GO TO 350               LLABEL     128
      GO TO 300                                                         LLABEL     129
  350 CONTINUE                                                          LLABEL     130
      NTAPEA = IOS(IO)                                                  LLABEL     131
      IF (NTAPEA  .NE. NTAPE) GO TO 300                                 LLABEL     132
      IOSUM(IO)  =  IOSUM(IO) - 1                                       LLABEL     133
      CALL TITLES (1)                                                   LLABEL     134
      IF (KOUNT .GT. 3*(KTMH-NO)) GO TO 380                             LLABEL     135
      WRITE (ITAPEW,1010)                                               LLABEL     136
      CALL PLB (1,1,ITAPEW)                                             LLABEL     137
      WRITE (ITAPEW,1100)                                               LLABEL     138
      CALL PLB (1,1,ITAPEW)                                             LLABEL     139
      KOUNT  =  KOUNT + 5                                               LLABEL     140
  380 KOUNT  =  KOUNT + 1                                               LLABEL     141
      WRITE (ITAPEW,1200) PNAME,CNAME,UNITNA,FILENA,NTAPE,NFILE         LLABEL     142
     1                    ,IROWS,JCOLS,NPAGET                           LLABEL     143
      GO TO 300                                                         LLABEL     144
  400 CONTINUE                                                          LLABEL     145
C                                                                       LLABEL     146
      IF (KBLAB .EQ. 2) GO TO 430                                       LLABEL     147
      IF (KLAB .LT. KLABT) GO TO 275                                    LLABEL     148
  430 CONTINUE                                                          LLABEL     149
  450 CONTINUE                                                          LLABEL     150
      KROUPD =  O                                                       LLABEL     151
  950 CONTINUE                                                          LLABEL     152
C                                                                       LLABEL     153
C FORMATS                                                               LLABEL     154
 1000 FORMAT (1OX,           4OHINPUT-OUTPUT MATRIX LABELS AS GENERATED LLABEL     155
     1            18HWITHIN THE PROGRAM)                                LLABEL     156
 1100 FORMAT (1OX,                                                      LLABEL     157
     1 3OHCALLING   CALLED   UNIT   FILE ,/, 1OX,                       LLABEL     158
     2 57HPROGRAM   PROGRAM  NAME   NAME      UNIT FILE  ROWS  COLS     LLABEL     159
     3,11X, 4HPAGE)                                                     LLABEL     160
 1010 FORMAT (1OX,51HINPUT-OUTPUT MATRIX LABELS IN NUMERICAL ORDER OF I/ LLABEL    161
     1          , 7HO UNITS)                                            LLABEL     162
 1200 FORMAT (1OX,1A8,2X,1A6,3X,1A6,1X,2A4,2X,1I4,1X,1I4,   2I6         LLABEL     163
     1        ,11X,1I4)                                                 LLABEL     164
C                                                                       LLABEL     165
      RETURN                                                            LLABEL     166
      END                                                               LLABEL     167
```

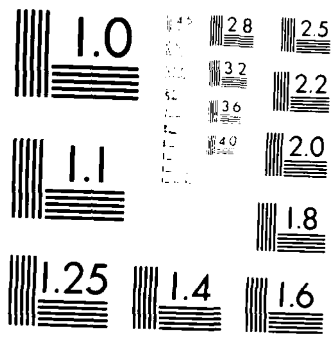
```
      SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS      DEF LINE      REFERENCES
    3 LLABEL          23          165

VARIABLES      SN  TYPE            RELOCATION
  430 CNAME        REAL                          REFS       60      96      141   DEFINED      73      117
  250 DSIO         REAL                          REFS       83     127  DEFINED        50
  435 EQU          REAL      ARRAY               REFS       30    8*40  DEFINED        73     117
  437 FILENA       REAL      ARRAY               REFS       31      40       60        96     141
  247 FSIO         REAL                          REFS       79     123  DEFINED        49
  433 IE           INTEGER                       REFS       73     117  DEFINED        73     117
  425 IO           INTEGER                       REFS       55      56      110       116     130   2*132
                                              DEFINED       54     109
  601 IOS          INTEGER   ARRAY               REFS       29     130  DEFINED        56      86
  745 IOSUM        INTEGER   ARRAY               REFS       29      87      110       116     132
                                              DEFINED       55      87      132
  442 IROWS        INTEGER                       REFS       40      60       96       141
    4 ITAPEL       INTEGER          LABELS       REFS       36  I/O REFS     60        70      73      114     117
    0 ITAPEW       INTEGER           F.P.        REFS       91      93      136       138  DEFINED     23
                                             I/O REFS       90      92       96       135     137      141
  443 JCOLS        INTEGER                       REFS       40      60       96       141
    0 KBLAB        INTEGER           F.P.        REFS       76     101      120       146  DEFINED     23
    7 KBPAGE       INTEGER          CLIST        REFS       34
    3 KDLABI       INTEGER          LABELS       REFS       36      51       82       126
    1 KDLABO       INTEGER          LABELS       REFS       36      44
    2 KFLABI       INTEGER          LABELS       REFS       36      51       78       122
    0 KFLABO       INTEGER          LABELS       REFS       36      44
  432 KLAB         INTEGER                       REFS       69      77       79        83     102      113     121
                                                  123      127     147  DEFINED        67      69      111     113
    4 KLABEL       INTEGER          CLIST        REFS       34
  423 KLABT        INTEGER                       REFS       83     102      127       147  DEFINED     51
    0 KOUNT        INTEGER          CLIST        REFS       34      89       94        95     134      139     140
                                              DEFINED       71      94       95       108     139      140
   11 KOUNTH       INTEGER          CLIST        REFS       34
   12 KOUNTI       INTEGER          CLIST        REFS       34
    1 KPAGE        INTEGER          CLIST        REFS       34
  435 KROUP        INTEGER                       REFS       40      57       60        74      75      118     119
                                              DEFINED       52      58
    0 KROUPD       INTEGER           F.P.        REFS       52  DEFINED      23       150
    0 KTMH         INTEGER          CTMH         REFS       37      89      134
    5 KTPAGE       INTEGER          CLIST        REFS       34
    2 LINES        INTEGER          CLIST        REFS       34      71      108
   10 LINESG       INTEGER          CLIST        REFS       34
    3 LINEST       INTEGER          CLIST        REFS       34
    1 LTMH         INTEGER          CTMH         REFS       37
  426 MAXV         INTEGER                       REFS       60      73      117   DEFINED      59       73     117
  441 NFILE        INTEGER                       REFS       40      60       96       141
  424 NIOS         INTEGER                       REFS       54     109  DEFINED        53
    0 NO           INTEGER          CONSTS       REFS       38      89      134
    6 NPAGE        INTEGER          CLIST        REFS       34      60
  444 NPAGET       INTEGER                       REFS       40      96      141
  436 NTAPE        INTEGER                       REFS       40      60     2*86      2*87      96      131     141
  434 NTAPEA       INTEGER                       REFS      131  DEFINED     130
  427 PNAME        REAL                          REFS       60      96      141   DEFINED      73      117
    2 TMH          REAL      ARRAY  CTMH         REFS       32      37
```

AD-A152 270 ESP (EXTERNAL-STORES PROGRAM) - A PILOT COMPUTER PROGRAM FOR DETERMINING..(U) GRUMMAN AEROSPACE CORP BETHPAGE NY J B SMEDFJELD FEB 85 ADCR-85-1-VOL-3-PT-1 2/8

UNCLASSIFIED N00019-81-C-0395 F/G 9/2 NL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2.8
2.5
3.2
2.2
3.6
4.0
2.0
1.1
1.8
1.25
1.4
1.6

```
VARIABLES     SN  TYPE            RELOCATION
  445  TSIO       REAL                              REFS         40         60         79      83         123         127
  431  UNITNA     REAL                              REFS         60         96        141    DEFINED       73         117
    1  YES        REAL                CONSTS        REFS         38
       VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS            TYPE    ARGS         REFERENCES
       PLB                     3                91        93         136        138
       TITLES                  1                88       133

STATEMENT LABELS                 DEF LINE    REFERENCES
    0  40                           56           54
   32  50                           62           57
   33  75                           68          102
   40  100                          72           75        80         84         98
   63  110                          81           77        78
   73  150                          85           76        79         83
  120  180                          95           89
  124  200                          99           74
  131  230                         103           82       101
  137  275                         112          147
  142  300                         115          119       124        128        131        143
  166  310                         125          121       122
  176  350                         129          120       123        127
  224  380                         140          134
  230  400                         144          118
  234  430                         148          126       146
  234  450                         149          109       110        116
  240  950                         151           44
  357  1000     FMT                154           90
  404  1010     FMT                160          135
  367  1100     FMT                156           92       137
  414  1200     FMT                162           96       141

LOOPS  LABEL     INDEX     FROM-TO     LENGTH     PROPERTIES
   22  40        IO         54  56        3B       INSTACK
  134  450       IO        109 149      103B                 EXT REFS

COMMON BLOCKS    LENGTH     MEMBERS - BIAS NAME(LENGTH)
       CLIST        11               0 KOUNT  (1)                 1 KPAGE  (1)                 2 LINES  (1)
                                     3 LINEST (1)                 4 KLABEL (1)                 5 KTPAGE (1)
                                     6 NPAGE  (1)                 7 KBPAGE (1)                 8 LINESG (1)
                                     9 KOUNTH (1)                10 KOUNTI (1)
       LABELS        5               0 KFLABO (1)                 1 KDLABO (1)                 2 KFLABI (1)
                                     3 KDLABI (1)                 4 ITAPEL (1)
       CTMH         38               0 KTMH   (1)                 1 LTMH   (1)                 2 TMH    (36)
       CONSTS        2               0 NO     (1)                 1 YES    (1)

EQUIV CLASSES    LENGTH     MEMBERS - BIAS NAME(LENGTH)
       EQU         100               0 KROUP  (1)                 1 NTAPE  (1)                 2 FILENA (2)
                                     4 NFILE  (1)                 5 IROWS  (1)                 6 JCOLS  (1)
                                     7 NPAGET (1)                 8 TSIO   (1)

STATISTICS
  PROGRAM LENGTH                 1116B      590
  CM LABELED COMMON LENGTH        70B        56
         52000B CM USED
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```
      C457000 SUB. FSIOFO (FORTRAN SEQUENTIAL I/O FOR FLUTTER OPTIMIZATION)    FSIOFO    2
      C                                                                        FSIOFO    3
            SUBROUTINE FSIOFO                                                  FSIOFO    4
      C                                                                        FSIOFO    5
      CIBM  BEGINNING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS      FSIOFO    6
      C     DOUBLE PRECISION FSIONS                                            FSIOFO    7
      C     DOUBLE PRECISION FDVIBA,FAICFA                                     FSIOFO    8
      CIBM  ENDING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS         FSIOFO    9
      C                                                                        FSIOFO   10
      C                                                                        FSIOFO   11
      CCDC  BEGINNING OF STATEMENTS ASSOCIATED WITH CDC COMPUTER PROGRAMS      FSIOFO   12
            DIMENSION IFILES(1)                                                FSIOFO   13
      CCDC  ENDING OF STATEMENTS ASSOCIATED WITH CDC COMPUTER PROGRAMS         FSIOFO   14
            DIMENSION KLUE(80),FSIONS(20),ITAPES(50)                           FSIOFO   15
            DIMENSION NFUF(20,3)                                               FSIOFO   16
      C                                                                        FSIOFO   17
      C                                                                        FSIOFO   18
      CCDC  BEGINNING OF STATEMENTS ASSOCIATED WITH CDC COMPUTER PROGRAMS      FSIOFO   19
            COMMON /CFILES/ KFILES,IFILES                                      FSIOFO   20
      CCDC  ENDING OF STATEMENTS ASSOCIATED WITH CDC COMPUTER PROGRAMS         FSIOFO   21
      C                                                                        FSIOFO   22
            COMMON /FSIO1 / LFUF  ,LFUFD ,NFUF                                 FSIOFO   23
            COMMON /FSIO2 / FSIONS                                             FSIOFO   24
            COMMON /CTAPES/ ITAPES                                             FSIOFO   25
            COMMON /COMRWP/ ITAPER,ITAPEW,ITAPEP                               FSIOFO   26
            COMMON /CLUEM / LKLUE ,KLUE                                        FSIOFO   27
      C                                                                        FSIOFO   28
      C                                                                        FSIOFO   29
      C INITIAL CONDITIONS                                                     FSIOFO   30
      C                                                                        FSIOFO   31
            DATA FDVIBA /8HIDVIBA  /                                           FSIOFO   32
            DATA FAICFA/ 8HIAICFA  /                                           FSIOFO   33
            DO 100 I=1,50                                                      FSIOFO   34
      C                                                                        FSIOFO   35
      CCDC  BEGINNING OF STATEMENTS ASSOCIATED WITH CDC COMPUTER PROGRAMS      FSIOFO   36
            IFILES(I) =  1                                                     FSIOFO   37
      CCDC  ENDING OF STATEMENTS ASSOCIATED WITH CDC COMPUTER PROGRAMS         FSIOFO   38
      C                                                                        FSIOFO   39
            ITAPES(I) =  I                                                     FSIOFO   40
        100 CONTINUE                                                           FSIOFO   41
            LFUF   =  2                                                        FSIOFO   42
            LFUFD  =  20                                                       FSIOFO   43
            KANAV  =  KLUE(3)                                                  FSIOFO   44
      C                                                                        FSIOFO   45
      C                                                                        FSIOFO   46
      C ENTER CARD DATA                                                        FSIOFO   47
      C                                                                        FSIOFO   48
            KFSIO  =  NO                                                       FSIOFO   49
            IF (KFSIO .EQ. NO) GO TO 200                                       FSIOFO   50
            READ (ITAPER,1000) IDVIBA,JDVIBA,KDVIBA,IAICFA,JAICFA,KAICFA       FSIOFO   51
        200 CONTINUE                                                           FSIOFO   52
      C                                                                        FSIOFO   53
      C                                                                        FSIOFO   54
      C TRANSFER I/O DATA FROM NONSUBSCRIPTED TO SUBSCRIPTED VARIABLES         FSIOFO   55
      C                                                                        FSIOFO   56
            IDVIBA =  17                                                       FSIOFO   57
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                 KDVIBA =  1                                                        FSIOFO     59
                 IAICFA =  O                                                        FSIOFO     60
                 JAICFA =  O                                                        FSIOFO     61
                 KAICFA =  O                                                        FSIOFO     62
                 IF (KANAV .EQ. 2) JDVIBA = O                                       FSIOFO     63
                 FSIONS( 1) =  FDVIBA                                               FSIOFO     64
                 NFUF( 1,1) =  IDVIBA                                               FSIOFO     65
                 NFUF( 1,2) =  JDVIBA                                               FSIOFO     66
                 NFUF( 1,3) =  KDVIBA                                               FSIOFO     67
                 FSIONS( 2) =  FAICFA                                               FSIOFO     68
                 NFUF( 2,1) =  IAICFA                                               FSIOFO     69
                 NFUF( 2,2) =  JAICFA                                               FSIOFO     70
                 NFUF( 2,3) =  KAICFA                                               FSIOFO     71
           C                                                                        FSIOFO     72
           C                                                                        FSIOFO     73
           C FORMATS                                                                FSIOFO     74
           C                                                                        FSIOFO     75
            1000 FORMAT ( 4(1I4,2I3))                                               FSIOFO     76
           C                                                                        FSIOFO     77
                 RETURN                                                             FSIOFO     78
                 END                                                                FSIOFO     79
```

```
SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS     DEF LINE     REFERENCES
    1  FSIOFO        3           77

VARIABLES      SN  TYPE            RELOCATION
   44  FAICFA     REAL                              REFS         67    DEFINED        32
   43  FDVIBA     REAL                              REFS         63    DEFINED        31
    O  FSIONS     REAL        ARRAY    FSIO2        REFS         14        23    DEFINED       63       67
   62  I          INTEGER                           REFS         36      2*39    DEFINED       33
   71  IAICFA     INTEGER                           REFS         68    DEFINED        50       59
   66  IDVIBA     INTEGER                           REFS         64    DEFINED        50       56
    1  IFILES     INTEGER     ARRAY    CFILES       REFS         12        19    DEFINED       36
    2  ITAPEP     INTEGER              COMRWP       REFS         25
    O  ITAPER     INTEGER              COMRWP       REFS         25    I/O REFS       50
    O  ITAPES     INTEGER     ARRAY    CTAPES       REFS         14        24    DEFINED       39
    1  ITAPEW     INTEGER              COMRWP       REFS         25
   72  JAICFA     INTEGER                           REFS         69    DEFINED        50       60
   67  JDVIBA     INTEGER                           REFS         65    DEFINED        50       57       62
   73  KAICFA     INTEGER                           REFS         70    DEFINED        50       61
   63  KANAV      INTEGER                           REFS         62    DEFINED        43
   70  KDVIBA     INTEGER                           REFS         66    DEFINED        50       58
    O  KFILES     INTEGER              CFILES       REFS         19
   64  KFSIO      INTEGER                           REFS         49    DEFINED        48
    1  KLUE       INTEGER     ARRAY    CLUEM        REFS         14        26        43
    O  LFUF       INTEGER              FSIO1        REFS         22    DEFINED        41
    1  LFUFD      INTEGER              FSIO1        REFS         22    DEFINED        42
    O  LKLUE      INTEGER              CLUEM        REFS         26
    2  NFUF       INTEGER     ARRAY    FSIO1        REFS         15        22    DEFINED       64       65       66       68
                                                      69         70
   65  NO         INTEGER    *UNDEF                 REFS         48        49
```

```
VARIABLES      SN  TYPE           RELOCATION
      VARIABLES USED AS FILE NAMES, SEE ABOVE

STATEMENT LABELS                DEF LINE   REFERENCES
    0   100                        40         33
   20   200                        51         49
   57   1000     FMT               75         50

LOOPS  LABEL     INDEX      FROM-TO     LENGTH   PROPERTIES
    5  100       I           33 40         3B     INSTACK

COMMON BLOCKS   LENGTH    MEMBERS - BIAS NAME(LENGTH)
      CFILES         2             0 KFILES (1)          1 IFILES (1)
      FSIO1         62             0 LFUF   (1)          1 LFUFD  (1)          2 NFUF   (60)
      FSIO2         20             0 FSIONS (20)
      CTAPES        50             0 ITAPES (50)
      COMRWP         3             0 ITAPER (1)          1 ITAPEW (1)          2 ITAPEP (1)
      CLUEM         81             0 LKLUE  (1)          1 KLUE   (80)

STATISTICS
  PROGRAM LENGTH                  74B      60
  CM LABELED COMMON LENGTH       332B     218
         52000B CM USED
```

```
      C45700 SUB. DSIOFO (DISK SEQUENTIAL I/O FOR FLUTTER  OPTIMIZATION)       DSIOFO     2
      C                                                                        DSIOFO     3
            SUBROUTINE DSIOFO                                                  DSIOFO     4
      C                                                                        DSIOFO     5
      CIBM  BEGINNING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS      DSIOFO     6
      C     DOUBLE PRECISION DSIONS                                            DSIOFO     7
      C     DOUBLE PRECISION DFLEX ,DSTIFF,DDEFLS,DMEMBS,DESTIF                DSIOFO     8
      CIBM  ENDING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS         DSIOFO     9
      C                                                                        DSIOFO    10
            DIMENSION DSIONS(20)                                               DSIOFO    11
            DIMENSION NDUF(20,3)                                               DSIOFO    12
      C                                                                        DSIOFO    13
            COMMON /COMRWP/ ITAPER,ITAPEW,ITAPEP                               DSIOFO    14
            COMMON /DSIO1 / LDUF  ,LDUFD ,NDUF                                 DSIOFO    15
            COMMON /DSIO2 / DSIONS                                             DSIOFO    16
      C                                                                        DSIOFO    17
      C                                                                        DSIOFO    18
      C INITIAL CONDITIONS                                                     DSIOFO    19
      C                                                                        DSIOFO    20
            DATA DFLEX  /8HLFLEX   /                                           DSIOFO    21
            DATA DSTIFF /8HLSTIFF  /                                           DSIOFO    22
            DATA DDEFLS /8HLDEFLS  /                                           DSIOFO    23
            DATA DMEMBS /8HLMEMBS  /                                           DSIOFO    24
            DATA DESTIF /8HLESTIF  /                                           DSIOFO    25
            LDUF   =  5                                                        DSIOFO    26
            LDUFD  =  20                                                       DSIOFO    27
      C                                                                        DSIOFO    28
      C                                                                        DSIOFO    29
      C ENTER CARD DATA                                                        DSIOFO    30
      C                                                                        DSIOFO    31
            KDSIO  =  NO                                                       DSIOFO    32
            IF (KDSIO .EQ. NO) GO TO 200                                       DSIOFO    33
            READ (ITAPER,1000) LFLEX ,MFLEX ,NFLEX ,LSTIFF,MSTIFF,NSTIFF       DSIOFO    34
           1                  ,LDEFLS,MDEFLS,NDEFLS,LMEMBS,MMEMBS,NMEMBS       DSIOFO    35
           2                  ,LESTIF,MESTIF,NESTIF                            DSIOFO    36
        200 CONTINUE                                                           DSIOFO    37
      C                                                                        DSIOFO    38
      C                                                                        DSIOFO    39
      C TRANSFER I/O DATA FROM NONSUBSCRIPTED VARIABLES TO SUBSCRIPTED         DSIOFO    40
      C VARIABLES                                                              DSIOFO    41
      C                                                                        DSIOFO    42
            LFLEX  =  0                                                        DSIOFO    43
            MFLEX  =  0                                                        DSIOFO    44
            NFLEX  =  0                                                        DSIOFO    45
            LSTIFF =  0                                                        DSIOFO    46
            MSTIFF =  0                                                        DSIOFO    47
            NSTIFF =  0                                                        DSIOFO    48
            LDEFLS =  0                                                        DSIOFO    49
            MDEFLS =  0                                                        DSIOFO    50
            NDEFLS =  0                                                        DSIOFO    51
            LMEMBS =  0                                                        DSIOFO    52
            MMEMBS =  0                                                        DSIOFO    53
            NMEMBS =  0                                                        DSIOFO    54
            LESTIF =  0                                                        DSIOFO    55
            MESTIF =  0                                                        DSIOFO    56
            NESTIF =  0                                                        DSIOFO    57
```

```
                NDUF( 1,1) =  LFLEX                                          DSIOFO      59
                NDUF( 1,2) =  MFLEX                                          DSIOFO      60
                NDUF( 1,3) =  NFLEX                                          DSIOFO      61
                DSIONS( 2) =  DSTIFF                                         DSIOFO      62
                NDUF( 2,1) =  LSTIFF                                         DSIOFO      63
                NDUF( 2,2) =  MSTIFF                                         DSIOFO      64
                NDUF( 2,3) =  NSTIFF                                         DSIOFO      65
                DSIONS( 3) =  DDEFLS                                         DSIOFO      66
                NDUF( 3,1) =  LDEFLS                                         DSIOFO      67
                NDUF( 3,2) =  MDEFLS                                         DSIOFO      68
                NDUF( 3,3) =  NDEFLS                                         DSIOFO      69
                DSIONS( 4) =  DMEMBS                                         DSIOFO      70
                NDUF( 4,1) =  LMEMBS                                         DSIOFO      71
                NDUF( 4,2) =  MMEMBS                                         DSIOFO      72
                NDUF( 4,3) =  NMEMBS                                         DSIOFO      73
                DSIONS( 5) =  DESTIF                                         DSIOFO      74
                NDUF( 5,1) =  LESTIF                                         DSIOFO      75
                NDUF( 5,2) =  MESTIF                                         DSIOFO      76
                NDUF( 5,3) =  NESTIF                                         DSIOFO      77
          C                                                                  DSIOFO      78
          C                                                                  DSIOFO      79
          C FORMATS                                                          DSIOFO      80
           1000 FORMAT ( 4(1I4,2I3))                                         DSIOFO      81
          C                                                                  DSIOFO      82
                RETURN                                                       DSIOFO      83
                END                                                          DSIOFO      84
```

```
      SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS      DEF LINE     REFERENCES
    1  DSIOFO          3           82

VARIABLES       SN  TYPE            RELOCATION
   41  DDEFLS     REAL                              REFS      65    DEFINED      22
   43  DESTIF     REAL                              REFS      73    DEFINED      24
   37  DFLEX      REAL                              REFS      57    DEFINED      20
   42  DMEMBS     REAL                              REFS      69    DEFINED      23
    0  DSIONS     REAL         ARRAY    DSIO2       REFS      10        15    DEFINED     57      61      65      69
                                                      73
   40  DSTIFF     REAL                              REFS      61    DEFINED      21
    2  ITAPEP     INTEGER               COMRWP      REFS      13
    0  ITAPER     INTEGER               COMRWP      REFS      13    I/O REFS     33
    1  ITAPEW     INTEGER               COMRWP      REFS      13
   72  KDSIO      INTEGER                           REFS      32    DEFINED      31
  102  LDEFLS     INTEGER                           REFS      66    DEFINED      33     48
    0  LDUF       INTEGER               DSIO1       REFS      14    DEFINED      25
    1  LDUFD      INTEGER               DSIO1       REFS      14    DEFINED      26
  110  LESTIF     INTEGER                           REFS      74    DEFINED      33     54
   74  LFLEX      INTEGER                           REFS      58    DEFINED      33     42
  105  LMEMBS     INTEGER                           REFS      70    DEFINED      33     51
   77  LSTIFF     INTEGER                           REFS      62    DEFINED      33     45
  103  MDEFLS     INTEGER                           REFS      67    DEFINED      33     49
  111  MESTIF     INTEGER                           REFS      75    DEFINED      33     55
```

```
VARIABLES      SN  TYPE            RELOCATION
   75  MFLEX      INTEGER                            REFS      59   DEFINED      33      43
  106  MMEMBS     INTEGER                            REFS      71   DEFINED      33      52
  100  MSTIFF     INTEGER                            REFS      63   DEFINED      33      46
  104  NDEFLS     INTEGER                            REFS      68   DEFINED      33      50
    2  NDUF       INTEGER     ARRAY     DSIO1        REFS      11        14   DEFINED    58      59      60      62
                                                       63      64        66      67      68      70      71      72
                                                       74      75        76
  112  NESTIF     INTEGER                            REFS      76   DEFINED      33      56
   76  NFLEX      INTEGER                            REFS      60   DEFINED      33      44
  107  NMEMBS     INTEGER                            REFS      72   DEFINED      33      53
   73  NO         INTEGER,  *UNDEF                   REFS      31        32
  101  NSTIFF     INTEGER                            REFS      64   DEFINED      33      47
       VARIABLES USED AS FILE NAMES, SEE ABOVE

STATEMENT LABELS            DEF LINE   REFERENCES
   10  200                     36         32
   67  1000     FMT            80         33

COMMON BLOCKS   LENGTH     MEMBERS - BIAS NAME(LENGTH)
       COMRWP        3               0 ITAPER (1)           1 ITAPEW (1)           2 ITAPEP (1)
       DSIO1        62               0 LDUF   (1)           1 LDUFD  (1)           2 NDUF   (60)
       DSIO2        20               0 DSIONS (20)

STATISTICS
  PROGRAM LENGTH                 113B       75
  CM LABELED COMMON LENGTH       125B       85
          52000B CM USED
```

```
      C4570, SUB. PTABLE (PREPARE TABLE OF CONTENTS)                   PTABLE     2
      C                                                                PTABLE     3
            SUBROUTINE PTABLE (KLAST, NCHAR, CHAR)                     PTABLE     4
      C                                                                PTABLE     5
      CIBM  BEGINNING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS  PTABLE     6
      C     DOUBLE PRECISION DUMMY1,DUMMY2,DUMMY3                      PTABLE     7
      CIBM  ENDING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS PTABLE     8
      C                                                                PTABLE     9
            DIMENSION CHAR(15)                                         PTABLE    10
            COMMON /CLIST / KOUNT ,KPAGE ,LINES ,LINEST,KLABEL,KTPAGE,NPAGE    PTABLE    11
           1               ,KBPAGE,LINESG                              PTABLE    12
            COMMON /CTABLE/ KTABLE,NPASS ,NROWS, NCOLS , NCOLST,KTABLO,NPAGEA  PTABLE    13
           1               ,ITAPET                                     PTABLE    14
            COMMON /COMPUT/ KOMPUT,NCHARW                              PTABLE    15
      C                                                                PTABLE    16
            IF (KTABLO .EQ. 1) GO TO 300                               PTABLE    17
            IF (KTABLE .EQ. 1) GO TO 300                               PTABLE    18
            NPAGE  =  NPAGE + NPAGEA                                   PTABLE    19
        100 CONTINUE                                                   PTABLE    20
      C                                                                PTABLE    21
      C                                                                PTABLE    22
      C INITIAL CONDITIONS                                             PTABLE    23
      C                                                                PTABLE    24
            NCHARI =  NCHAR                                            PTABLE    25
            IF (NCHAR .GT. NCOLST) NCHARI = NCOLST                     PTABLE    26
            NWORDS =  (NCHARI-1)/NCHARW+ 1                             PTABLE    27
            KROUP  =  1                                                PTABLE    28
            MAXV   =  NWORDS + 8                                       PTABLE    29
      C                                                                PTABLE    30
      C                                                                PTABLE    31
      C PREPARE TABLE OF CONTENTS                                      PTABLE    32
      C                                                                PTABLE    33
            WRITE (ITAPET) MAXV, KROUP, KLAST, NCHAR, NPASS, NROWS, NCOLS      PTABLE    34
           1              ,NPAGE, NWORDS, (CHAR(N), N=1,NWORDS),DUMMY1,DUMMY2  PTABLE    35
           2              ,DUMMY3                                      PTABLE    36
      C                                                                PTABLE    37
            NPAGE  =  NPAGE - NPAGEA                                   PTABLE    38
            KTABLE = 1                                                 PTABLE    39
            NPAGEA  =  0                                               PTABLE    40
        300 CONTINUE                                                   PTABLE    41
      C                                                                PTABLE    42
            RETURN                                                     PTABLE    43
            END                                                        PTABLE    44
```

```
SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS     DEF LINE     REFERENCES
    3  PTABLE        3          42

VARIABLES      SN  TYPE          RELOCATION
    0  CHAR        REAL      ARRAY      F.P.        REFS        9       33    DEFINED        3
   62  DUMMY1   *  REAL     *UNDEF                  REFS       33
   63  DUMMY2   *  REAL     *UNDEF                  REFS       33
```

```
VARIABLES      SN  TYPE          RELOCATION
   64  DUMMY3  *  REAL      *UNDEF                  REFS         33
    7  ITAPET     INTEGER             CTABLE        REFS         12    I/O REFS       33
    7  KBPAGE     INTEGER             CLIST         REFS         10
    4  KLABEL     INTEGER             CLIST         REFS         10
    0  KLAST      INTEGER              F.P.         REFS         33    DEFINED         3
    0  KOMPUT     INTEGER             COMPUT        REFS         14
    0  KOUNT      INTEGER             CLIST         REFS         10
    1  KPAGE      INTEGER             CLIST         REFS         10
   57  KROUP      INTEGER                           REFS         33    DEFINED        27
    0  KTABLE     INTEGER             CTABLE        REFS         12         17    DEFINED        38
    5  KTABLO     INTEGER             CTABLE        REFS         12         16
    5  KTPAGE     INTEGER             CLIST         REFS         10
    2  LINES      INTEGER             CLIST         REFS         10
   10  LINESG     INTEGER             CLIST         REFS         10
    3  LINEST     INTEGER             CLIST         REFS         10
   60  MAXV       INTEGER                           REFS         33    DEFINED        28
   61  N          INTEGER                           REFS         33    DEFINED        33
    0  NCHAR      INTEGER              F.P.         REFS         24         25        33    DEFINED         3
   55  NCHARI     INTEGER                           REFS         26    DEFINED        24        25
    1  NCHARW     INTEGER             COMPUT        REFS         14         26
    3  NCOLS      INTEGER             CTABLE        REFS         12         33
    4  NCOLST     INTEGER             CTABLE        REFS         12       2*25
    6  NPAGE      INTEGER             CLIST         REFS         10         18        33        37    DEFINED        18        37
    6  NPAGEA     INTEGER             CTABLE        REFS         12         18        37    DEFINED        39
    1  NPASS      INTEGER             CTABLE        REFS         12         33
    2  NROWS      INTEGER             CTABLE        REFS         12         33
   56  NWORDS     INTEGER                           REFS         28       2*33    DEFINED        26
       VARIABLES USED AS FILE NAMES, SEE ABOVE

STATEMENT LABELS              DEF LINE   REFERENCES
    0  100         INACTIVE      19
   35  300                       40         16         17

COMMON BLOCKS   LENGTH     ,MEMBERS - BIAS NAME(LENGTH)
       CLIST        9                0 KOUNT  (1)              1 KPAGE  (1)              2 LINES  (1)
                                     3 LINEST (1)              4 KLABEL (1)              5 KTPAGE (1)
                                     6 NPAGE  (1)              7 KBPAGE (1)              8 LINESG (1)
       CTABLE       8                0 KTABLE (1)              1 NPASS  (1)              2 NROWS  (1)
                                     3 NCOLS  (1)              4 NCOLST (1)              5 KTABLO (1)
                                     6 NPAGEA (1)              7 ITAPET (1)
       COMPUT       2                0 KOMPUT (1)              1 NCHARW (1)

STATISTICS
  PROGRAM LENGTH                 65B       53
  CM LABELED COMMON LENGTH       23B       19
          52000B CM USED
```

```
C45700, SUB  PLABEL (PREPARE TABLE FOR FSIO AND/OR DSIO LABELS)          PLABEL     2
C                                                                        PLABEL     3
C*********************************************************************** PLABEL     4
C                                                                      * PLABEL     5
C***  SUBROUTINE PLABEL  *********************************************** PLABEL     6
C                                                                      * PLABEL     7
C***  COMPUTER VERSION  ************************************************ PLABEL     8
C     ----------------                                                 * PLABEL     9
C     IBM COMPUTER PROGRAM VERSION                                     * PLABEL    10
C                                                                      * PLABEL    11
C     FORTRAN STATEMENTS CONTAINED WITHIN THE TWO CARDS IDENTIFIED     * PLABEL    12
C     BY CIBM IN COLUMNS ONE TO FOUR ARE ASSOCIATED WITH THE IBM       * PLABEL    13
C     COMPUTER AND SHOULD BE LEFT BLANK.                               * PLABEL    14
C                                                                      * PLABEL    15
C     CDC COMPUTER PROGRAM VERSION                                     * PLABEL    16
C                                                                      * PLABEL    17
C     FORTRAN STATEMENTS CONTAINED WITHIN THE TWO CARDS IDENTIFIED     * PLABEL    18
C     BY CIBM IN COLUMNS ONE TO FOUR ARE ASSOCIATED WITH THE IBM       * PLABEL    19
C     COMPUTER AND SHOULD HAVE A C IN COLUMN ONE.                      * PLABEL    20
C                                                                      * PLABEL    21
C*********************************************************************** PLABEL    22
C                                                                        PLABEL    23
      SUBROUTINE PLABEL (PNAME,CNAME,NTAPE,NAME,NFILE,IROWS,JCOLS,TSIO)  PLABEL    24
C                                                                        PLABEL    25
CIBM  BEGINNING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS      PLABEL    26
C     DOUBLE PRECISION PNAME ,CNAME ,UNITNA                              PLABEL    27
CIBM  ENDING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS         PLABEL    28
C                                                                        PLABEL    29
      DIMENSION NAME(2)                                                  PLABEL    30
C                                                                        PLABEL    31
      COMMON /CLIST / KOUNT ,KPAGE ,LINES ,LINEST,KLABEL,KTPAGE,NPAGE    PLABEL    32
     1               ,KBPAGE,LINESG,KOUNTH,KOUNTI                        PLABEL    33
      COMMON /LABELS/ KFLABO,KDLABO,KFLABI,KDLABI,ITAPEL,KLABEI          PLABEL    34
      COMMON /COMRWP/ ITAPER,ITAPEW,ITAPEP                               PLABEL    35
C                                                                        PLABEL    36
C                                                                        PLABEL    37
C INITIAL CONDIONS                                                       PLABEL    38
C                                                                        PLABEL    39
      DATA FSIO   /4HFSIO/                                               PLABEL    40
      DATA DSIO   /4HDSIO/                                               PLABEL    41
      DATA UNITNA /8H        /                                           PLABEL    42
C                                                                        PLABEL    43
C                                                                        PLABEL    44
C LIST LABELS IN THE CURRENT CALCULATION                                 PLABEL    45
C                                                                        PLABEL    46
      IF (KLABEI .EQ. 1) GO TO 50                                        PLABEL    47
      LEFT=LINES-KOUNT                                                   PLABEL    48
      IF(LEFT.LT.3) KOUNT=LINES                                          PLABEL    49
      CALL TITLES(2)                                                     PLABEL    50
      KOUNT=KOUNT+3                                                      PLABEL    51
      WRITE (ITAPEW,1000) CNAME,PNAME,NAME   ,NTAPE,NFILE,IROWS,JCOLS    PLABEL    52
   50 CONTINUE                                                           PLABEL    53
C                                                                        PLABEL    54
C                                                                        PLABEL    55
C PREPARE TABLE FOR INPUT-OUTPUT LABELS                                  PLABEL    56
C                                                                        PLABEL    57
      IF (KLABEL .EQ. 1) GO TO 400                                       PLABEL    58
```

```
      IF (TSIO  EQ  FSIO  AND  KFLABO  EQ  2) GO TO 100              PLABEL    59
      IF (TSIO  EQ  DSIO  .AND  KDLABO .EQ  2) GO TO 110             PLABEL    60
      GO TO 300                                                      PLABEL    61
  100 CONTINUE                                                       PLABEL    62
      KFLABI =  2                                                    PLABEL    63
      GO TO 120                                                      PLABEL    64
  110 CONTINUE                                                       PLABEL    65
      KDLABI =  2                                                    PLABEL    66
  120 CONTINUE                                                       PLABEL    67
      KROUP  =  2                                                    PLABEL    68
      MAXV   =  9                                                    PLABEL    69
      WRITE (ITAPEL) MAXV,KROUP,NTAPE,NAME,NFILE,IROWS,JCOLS,NPAGE,TSIO PLABEL 70
     1               ,PNAME,CNAME,UNITNA                             PLABEL    71
C                                                                    PLABEL    72
  300 CONTINUE                                                       PLABEL    73
  400 CONTINUE                                                       PLABEL    74
C                                                                    PLABEL    75
C                                                                    PLABEL    76
C FORMATS                                                            PLABEL    77
 1000 FORMAT (1X,/,10X, 5HFROM ,1A6, 1X, 10HCALLED BY , 1A8          PLABEL    78
     1              ,/,10X,3X, 7HNAME = ,2A4, 1H,,2X                 PLABEL    79
     2              ,     7HUNIT = ,I2,1H,,2X                        PLABEL    80
     3              ,   7HFILE = , I2,1H,,2X                         PLABEL    81
     4              ,   7HROWS = , I5,1H,,2X                         PLABEL    82
     5              ,   7HCOLS = ,I5)                                PLABEL    83
C                                                                    PLABEL    84
      RETURN                                                         PLABEL    85
      END                                                            PLABEL    86
```

SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS	DEF LINE	REFERENCES
3 PLABEL	23	84

VARIABLES	SN	TYPE	RELOCATION							
0	CNAME	REAL	F.P.	REFS	51	69	DEFINED	23		
46	DSIO	REAL		REFS	59	DEFINED	40			
45	FSIO	REAL		REFS	58	DEFINED	39			
0	IROWS	INTEGER	F.P.	REFS	51	69	DEFINED	23		
4	ITAPEL	INTEGER	LABELS	REFS	33	I/O REFS	69			
2	ITAPEP	INTEGER	COMRWP	REFS	34					
0	ITAPER	INTEGER	COMRWP	REFS	34					
1	ITAPEW	INTEGER	COMRWP	REFS	34	I/O REFS	51			
0	JCOLS	INTEGER	F.P.	REFS	51	69	DEFINED	23		
7	KBPAGE	INTEGER	CLIST	REFS	31					
3	KDLABI	INTEGER	LABELS	REFS	33	DEFINED	65			
1	KDLABO	INTEGER	LABELS	REFS	33	59				
2	KFLABI	INTEGER	LABELS	REFS	33	DEFINED	62			
0	KFLABO	INTEGER	LABELS	REFS	33					
5	KLABEI	INTEGER	LABELS	REFS	33					
4	KLABEL	INTEGER	CLIST	REFS	31					
0	KOUNT	INTEGER	CLIST	REFS	31	47	50	DEFINED	48	50
11	KOUNTH	INTEGER	CLIST	REFS	31					

```
VARIABLES      SN  TYPE            RELOCATION
   12  KOUNTI     INTEGER             CLIST        REFS        31
    1  KPAGE      INTEGER             CLIST        REFS        31
  120  KROUP      INTEGER                          REFS        69   DEFINED      67
    5  KTPAGE     INTEGER             CLIST        REFS        31
  117  LEFT       INTEGER                          REFS        48   DEFINED      47
    2  LINES      INTEGER             CLIST        REFS        31      47        48
   10  LINESG     INTEGER             CLIST        REFS        31
    3  LINEST     INTEGER             CLIST        REFS        31
  121  MAXV       INTEGER                          REFS        69   DEFINED      68
    0  NAME       INTEGER    ARRAY     F.P.        REFS        29      51        69   DEFINED      23
    0  NFILE      INTEGER              F.P.        REFS        51      69   DEFINED      23
    6  NPAGE      INTEGER             CLIST        REFS        31      69
    0  NTAPE      INTEGER              F.P.        REFS        51      69   DEFINED      23
    0  PNAME      REAL                 F.P.        REFS        51      69   DEFINED      23
    0  TSIO       REAL                 F.P.        REFS        58      59        69   DEFINED      23
   47  UNITNA     REAL                             REFS        69   DEFINED      41
       VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS          TYPE   ARGS        REFERENCES
       TITLES               1             49

STATEMENT LABELS            DEF LINE   REFERENCES
   20  50                      52          46
   33  100                     61          58
   35  110                     64          59
   36  120                     66          63
   42  300                     72          60
   42  400                     73          57
  100  1000     FMT            77          51

COMMON BLOCKS    LENGTH    MEMBERS - BIAS NAME(LENGTH)
       CLIST        11              0 KOUNT  (1)             1 KPAGE  (1)             2 LINES  (1)
                                    3 LINEST (1)             4 KLABEL (1)             5 KTPAGE (1)
                                    6 NPAGE  (1)             7 KBPAGE (1)             8 LINESG (1)
                                    9 KOUNTH (1)            10 KOUNTI (1)
       LABELS        6              0 KFLABO (1)             1 KDLABO (1)             2 KFLABI (1)
                                    3 KDLABI (1)             4 ITAPEL (1)             5 KLABEI (1)
       COMRWP        3              0 ITAPER (1)             1 ITAPEW (1)             2 ITAPEP (1)

STATISTICS
  PROGRAM LENGTH                122B       82
  CM LABELED COMMON LENGTH       24B       20
         52000B CM USED
```

```
ENTRY POINTS     DEF LINE     REFERENCES
    3  MESAGE         4          49

VARIABLES      SN  TYPE            RELOCATION
    2  ITAPEP     INTEGER              COMRWP       REFS          10
    0  ITAPER     INTEGER              COMRWP       REFS          10
    1  ITAPEW     INTEGER              COMRWP       REFS          10         26    I/O REFS        27          28          29
    7  KBPAGE     INTEGER              CLIST        REFS          11
    4  KLABEL     INTEGER              CLIST        REFS          11
    0  KMESAG     INTEGER              MESAG        REFS          13         17
    0  KOMPUT     INTEGER              COMPUT       REFS          15
    0  KOUNT      INTEGER              CLIST        REFS          11         23          30     DEFINED          24          30
   11  KOUNTH     INTEGER              CLIST        REFS          11
   12  KOUNTI     INTEGER              CLIST        REFS          11         24          30     DEFINED          22
    1  KPAGE      INTEGER              CLIST        REFS          11
    2  KTIME      INTEGER              MESAG        REFS          13
    1  KTITLE     INTEGER              MESAG        REFS          13
    5  KTPAGE     INTEGER              CLIST        REFS          11
    0  KTYPE      INTEGER               F.P.        REFS          19         27          28          29     DEFINED           4
  132  L          INTEGER                           REFS          27         28          29     DEFINED          27          28          29
  131  LEFT       INTEGER                           REFS          24    DEFINED          23
    2  LINES      INTEGER              CLIST        REFS          11         23          24
   10  LINESG     INTEGER              CLIST        REFS          11
    3  LINEST     INTEGER              CLIST        REFS          11
    0  NCHAR      INTEGER               F.P.        REFS          20    DEFINED           4
    1  NCHARW     INTEGER              COMPUT       REFS          15         21
  127  NCHAR1     INTEGER                           REFS          21         22     DEFINED          20
  126  NDIV       INTEGER                           REFS          22    DEFINED          18          19
    0  NO         INTEGER              CONSTS       REFS          14         17
    6  NPAGE      INTEGER              CLIST        REFS          11
  130  NWORDS     INTEGER                           REFS          27         28          29     DEFINED          21
    0  TEXT       REAL        ARRAY     F.P         REFS           8         27          28          29     DEFINED           4
    1  YES        INTEGER              CONSTS       REFS           6         14
       VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS          TYPE    ARGS         REFERENCES
       PLB                   3             26
       TITLES                1             25         33

STATEMENT LABELS              DEF LINE    REFERENCES
   62  500                       32           17
   64  600                       34           31
  107  1000     FMT              43           27
  114  2000     FMT              44           28
  121  3000     FMT              45           29

COMMON BLOCKS    LENGTH     MEMBERS - BIAS NAME(LENGTH)
       COMRWP       3              0 ITAPER (1)              1 ITAPEW (1)              2 ITAPEP (1)
       CLIST       11              0 KOUNT  (1)              1 KPAGE  (1)              2 LINES  (1)
                                   3 LINEST (1)              4 KLABEL (1)              5 KTPAGE (1)
                                   6 NPAGE  (1)              7 KBPAGE (1)              8 LINESG (1)
                                   9 KOUNTH (1)             10 KOUNTI (1)
       MESAG        3              0 KMESAG (1)              1 KTITLE (1)              2 KTIME  (1)
       CONSTS       2              0 NO     (1)              1 YES    (1)
       COMPUT       2              0 KOMPUT (1)              1 NCHARW (1)
```

```
      C                                                                         MESAGE     2
      C45700. SUB  MESAGE (ENTER AND LEAVE MESSAGES FROM CALLING PROGRAMS)      MESAGE     3
      C                                                                         MESAGE     4
            SUBROUTINE MESAGE (KTYPE,NCHAR,TEXT)                                MESAGE     5
      C                                                                         MESAGE     6
            INTEGER YES                                                         MESAGE     7
      C                                                                         MESAGE     8
            DIMENSION TEXT(1)                                                   MESAGE     9
      C                                                                         MESAGE    10
            COMMON /COMRWP/ ITAPER,ITAPEW,ITAPEP                                MESAGE    11
            COMMON /CLIST / KOUNT ,KPAGE ,LINES ,LINEST,KLABEL,KTPAGE,NPAGE     MESAGE    12
           1               ,KBPAGE,LINESG,KOUNTH,KOUNTI                         MESAGE    13
            COMMON /MESAG / KMESAG,KTITLE,KTIME                                 MESAGE    14
            COMMON /CONSTS/ NO    ,YES                                          MESAGE    15
            COMMON /COMPUT/ KOMPUT,NCHARW                                       MESAGE    16
      C                                                                         MESAGE    17
            IF (KMESAG .EQ. NO) GO TO 500                                       MESAGE    18
            NDIV   =  60                                                        MESAGE    19
            IF (KTYPE .EQ. 3) NDIV = 72                                         MESAGE    20
            NCHAR1 =  NCHAR - 1                                                 MESAGE    21
            NWORDS =  NCHAR1/NCHARW + 1                                         MESAGE    22
            KOUNTI =  NCHAR1/NDIV + 3                                           MESAGE    23
            LEFT=LINES-KOUNT                                                    MESAGE    24
            IF(LEFT.LT.KOUNTI) KOUNT=LINES                                      MESAGE    25
            CALL TITLES(2)                                                      MESAGE    26
            CALL PLB (1,2,ITAPEW)                                               MESAGE    27
            IF (KTYPE .EQ. 1) WRITE (ITAPEW,1000) (TEXT(L), L=1,NWORDS)         MESAGE    28
            IF (KTYPE .EQ. 2) WRITE (ITAPEW,2000) (TEXT(L), L=1,NWORDS)         MESAGE    29
            IF (KTYPE .EQ. 3) WRITE (ITAPEW,3000) (TEXT(L), L=1,NWORDS)         MESAGE    30
            KOUNT=KOUNT+KOUNTI                                                  MESAGE    31
            GO TO 600                                                           MESAGE    32
        500 CONTINUE                                                            MESAGE    33
            CALL TITLES(2)                                                      MESAGE    34
        600 CONTINUE                                                            MESAGE    35
      C                                                                         MESAGE    36
      CIBM  BEGINNING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS       MESAGE    37
      C1000 FORMAT (10X, 12HENTER PROG. ,15A4 / (22X, 15A4))                    MESAGE    38
      C2000 FORMAT (10X, 12HLEAVE PROG. ,15A4 / (22X, 15A4))                    MESAGE    39
      C3000 FORMAT (10X, 18A4)                                                  MESAGE    40
      CIBM  ENDING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS          MESAGE    41
      C                                                                         MESAGE    42
      CCDC  BEGINNING OF STATEMENTS ASSOCIATED WITH CDC COMPUTER PROGRAMS       MESAGE    43
       1000 FORMAT (10X, 12HENTER PROG. ,6A10 / (22X, 6A10))                    MESAGE    44
       2000 FORMAT (10X, 12HLEAVE PROG. ,6A10 / (22X, 6A10))                    MESAGE    45
       3000 FORMAT (10X, 7A10,1A2)                                              MESAGE    46
      CCDC  ENDING OF STATEMENTS ASSOCIATED WITH CDC COMPUTER PROGRAMS          MESAGE    47
      C                                                                         MESAGE    48
      C                                                                         MESAGE    49
            RETURN                                                              MESAGE    50
            END                                                                 MESAGE    51
```

SYMBOLIC REFERENCE MAP (R=3)

```
ENTRY POINTS      DEF LINE      REFERENCES
    3  FCLOSE          3          40

VARIABLES      SN  TYPE            RELOCATION
    1  IFILES     INTEGER    ARRAY     CFILES       REFS         6         7   DEFINED        19        35
    O  KFILES     INTEGER              CFILES       REFS         7
    O  KGEN       INTEGER               F.P.        REFS        10   DEFINED         3
    O  NFILE      INTEGER               F.P.        REFS        19        35   DEFINED         3
    O  NTAPE      INTEGER               F.P.        REFS        19        35   DEFINED         3   I/O REFS      16
       VARIABLES USED AS FILE NAMES, SEE ABOVE

STATEMENT LABELS              DEF LINE   REFERENCES
   14  200                       15         10
   22  300                       27         10
   24  400                       38         22

COMMON BLOCKS   LENGTH      MEMBERS - BIAS NAME(LENGTH)
       CFILES        2               O KFILES (1)               1 IFILES (1)

STATISTICS
  PROGRAM LENGTH                 26B        22
  CM LABELED COMMON LENGTH        2B         2
          52000B CM USED
```

```
 1    C45700 SUB. FCLOSE (FORTRAN CLOSING (END OF FILE) OR REWINDING OF I/O)   FCLOSE      2
      C                                                                         FCLOSE      3
            SUBROUTINE FCLOSE (NTAPE,NFILE,KGEN)                                FCLOSE      4
      C                                                                         FCLOSE      5
 5    CCDC  BEGINNING OF STATEMENTS ASSOCIATED WITH CDC COMPUTER PROGRAMS       FCLOSE      6
            DIMENSION IFILES(1)                                                 FCLOSE      7
            COMMON /CFILES/ KFILES,IFILES                                       FCLOSE      8
      CCDC  ENDING OF STATEMENTS ASSOCIATED WITH CDC COMPUTER PROGRAMS          FCLOSE      9
      C                                                                         FCLOSE     10
10          GO TO (200, 300), KGEN                                              FCLOSE     11
      C                                                                         FCLOSE     12
      C                                                                         FCLOSE     13
      C CLOSE FILE AT THE END OF A WRITE                                        FCLOSE     14
      C                                                                         FCLOSE     15
15      200 CONTINUE                                                            FCLOSE     16
            END FILE NTAPE                                                      FCLOSE     17
      C                                                                         FCLOSE     18
      CCDC  BEGINNING OF STATEMENTS ASSOCIATED WITH CDC COMPUTER PROGRAMS       FCLOSE     19
            IFILES(NTAPE) =  NFILE + 1                                          FCLOSE     20
20    CCDC  ENDING OF STATEMENTS ASSOCIATED WITH CDC COMPUTER PROGRAMS          FCLOSE     21
      C                                                                         FCLOSE     22
            GO TO 400                                                           FCLOSE     23
      C                                                                         FCLOSE     24
      C                                                                         FCLOSE     25
25    C CLOSE FILE AT THE END OF A READ                                         FCLOSE     26
      C                                                                         FCLOSE     27
        300 CONTINUE                                                            FCLOSE     28
      C                                                                         FCLOSE     29
      CIBM  BEGINNING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS       FCLOSE     30
30    C     REWIND NTAPE                                                        FCLOSE     31
      CIBM  ENDING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS          FCLOSE     32
      C                                                                         FCLOSE     33
      C                                                                         FCLOSE     34
      CCDC  BEGINNING OF STATEMENTS ASSOCIATED WITH CDC COMPUTER PROGRAMS       FCLOSE     35
35          IFILES(NTAPE) =  NFILE                                              FCLOSE     36
      CCDC  ENDING OF STATEMENTS ASSOCIATED WITH CDC COMPUTER PROGRAMS          FCLOSE     37
      C                                                                         FCLOSE     38
        400 CONTINUE                                                            FCLOSE     39
      C                                                                         FCLOSE     40
40          RETURN                                                              FCLOSE     41
            END                                                                 FCLOSE     42
```

CARD NR.	SEVERITY	DETAILS	DIAGNOSIS OF PROBLEM
10	I		AN IF STATEMENT MAY BE MORE EFFICIENT THAN A 2 OR 3 BRANCH COMPUTED GO TO STATEMENT.

SYMBOLIC REFERENCE MAP (R=3)

```
      SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS      DEF LINE      REFERENCES
    3  TSIO          3          48

VARIABLES      SN  TYPE              RELOCATION
   73  IFILE    *  INTEGER                           DEFINED       46
    0  INCFIL      INTEGER   *UNUSED       F.P.      DEFINED        3
   66  IO          INTEGER                              REFS       17         18        31        33   DEFINED       16       30
   67  IOS         INTEGER                              REFS       21         37        44        46   DEFINED       17
    0  KGEN        INTEGER                 F.P.         REFS       23    DEFINED         3
   70  LASTF       INTEGER                              REFS       34         36   DEFINED        29        34
    0  LOCFIL      INTEGER   *UNUSED       F.P.      DEFINED        3
    0  LTUF        INTEGER                 F.P.         REFS       16         30   DEFINED         3
    0  LTUFD       INTEGER                 F.P.         REFS       10         11   DEFINED         3
   72  NEXTF       INTEGER                              REFS       34    DEFINED        33
   71  NEXTIO      INTEGER                              REFS       32    DEFINED        31
    0  NFILE       INTEGER                 F.P.         REFS       37    DEFINED         3        36        44
    0  NTAPE       INTEGER                 F.P.         REFS       32    DEFINED         3        21
    0  NTUF        INTEGER    ARRAY        F.P.         REFS       11         21        31        33        44        46
                                                     DEFINED        3         37
    0  TSION       REAL                    F.P.         REFS       18    DEFINED         3
    0  TSIONS      REAL       ARRAY        F.P.         REFS       10         18   DEFINED         3

INLINE FUNCTIONS    TYPE    ARGS        DEF LINE   REFERENCES
       MAXO       INTEGER    0  INTRIN                 34

STATEMENT LABELS              DEF LINE    REFERENCES
    0  100                       19          16
   17  120                       20          18
   31  200                       28          23
   46  230                       35          30         32
   55  300                       43          23
   61  400                       45          38

LOOPS   LABEL     INDEX      FROM-TO      LENGTH     PROPERTIES
   11   100       IO          16  19          6B      INSTACK     EXITS
   40   230       IO          30  35          7B      INSTACK

STATISTICS
  PROGRAM LENGTH                 101B        65
         52000B CM USED
```

```
SUBROUTINE TSIO       74/74   OPT=1                      FTN 4.8+577        85/01/23. 08.10.44       PAGE    1

 1          C45700 SUB  TSIO (SEARCH FOR TYPICAL SEQUENTIAL I/O UNITS AND FILES)    TSIO        2
            C                                                                       TSIO        3
                  SUBROUTINE TSIO (TSION,NTAPE,NFILE,INCFIL,LOCFIL,KGEN             TSIO        4
                 1                 ,TSIONS,NTUF,LTUF,LTUFD)                         TSIO        5
 5          C                                                                       TSIO        6
            CIBM  BEGINNING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS     TSIO        7
            C     DOUBLE PRECISION TSIONS,TSION                                     TSIO        8
            CIBM  ENDING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS        TSIO        9
            C                                                                       TSIO       10
10                DIMENSION TSIONS(LTUFD)                                           TSIO       11
                  DIMENSION NTUF(LTUFD,3)                                           TSIO       12
            C                                                                       TSIO       13
            C                                                                       TSIO       14
            C INITIAL CONDITIONS                                                    TSIO       15
15          C                                                                       TSIO       16
                  DO 100 IO=1,LTUF                                                  TSIO       17
                  IOS    =  IO                                                      TSIO       18
                  IF (TSION .EQ. TSIONS(IO)) GO TO 120                              TSIO       19
              100 CONTINUE                                                          TSIO       20
20            120 CONTINUE                                                          TSIO       21
                  NTAPE  =  NTUF(IOS,1)                                             TSIO       22
            C                                                                       TSIO       23
                  GO TO (200, 300), KGEN                                            TSIO       24
            C                                                                       TSIO       25
25          C                                                                       TSIO       26
            C DEFINE FILE NUMBER TO WRITE ON UNIT NTAPE                             TSIO       27
            C                                                                       TSIO       28
              200 CONTINUE                                                          TSIO       29
                  LASTF  =  0                                                       TSIO       30
30                DO 230 IO=1,LTUF                                                  TSIO       31
                  NEXTIO =  NTUF(IO,1)                                              TSIO       32
                  IF (NTAPE .NE. NEXTIO) GO TO 230                                  TSIO       33
                  NEXTF  =  NTUF(IO,2)                                              TSIO       34
                  LASTF  =  MAXO(LASTF,NEXTF)                                       TSIO       35
35            230 CONTINUE                                                          TSIO       36
                  NFILE  =  LASTF + 1                                               TSIO       37
                  NTUF(IOS,2) =  NFILE                                              TSIO       38
                  GO TO 400                                                         TSIO       39
            C                                                                       TSIO       40
40          C                                                                       TSIO       41
            C DEFINE FILE NUMBER TO READ FROM UNIT NTAPE  .                         TSIO       42
            C                                                                       TSIO       43
              300 CONTINUE                                                          TSIO       44
                  NFILE  =  NTUF(IOS,2)                                             TSIO       45
45            400 CONTINUE                                                          TSIO       46
                  IFILE  =  NTUF(IOS,3)                                             TSIO       47
            C                                                                       TSIO       48
                  RETURN                                                            TSIO       49
                  END                                                               TSIO       50


CARD NR. SEVERITY  DETAILS    DIAGNOSIS OF PROBLEM

   23      I                  AN IF STATEMENT MAY BE MORE EFFICIENT THAN A 2 OR 3 BRANCH COMPUTED GO TO STATEMENT.
```

```
      C45700 SUB. DSIO (SEARCH FOR DISK SEQUENTIAL I/O UNITS AND FILES)        DSIO     2
      C                                                                        DSIO     3
            SUBROUTINE DSIO (DSION,NTAPE,NFILE,INCFIL,LOCFIL,KGEN)             DSIO     4
      C                                                                        DSIO     5
      CIBM  BEGINNING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS      DSIO     6
      C     DOUBLE PRECISION DSIONS,DSION                                      DSIO     7
      CIBM  ENDING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS         DSIO     8
      C                                                                        DSIO     9
            COMMON /DSIO1 / LDUF   ,LDUFD ,NDUF                                DSIO    10
            COMMON /DSIO2 / DSIONS                                             DSIO    11
      C                                                                        DSIO    12
      C                                                                        DSIO    13
      C SEARCH FOR FORTRAN (DSIO) UNIT AND FILE NUMBERS                         DSIO    14
      C                                                                        DSIO    15
            CALL TSIO (DSION,NTAPE,NFILE,INCFIL,LOCFIL,KGEN                    DSIO    16
           1          ,DSIONS,NDUF,LDUF,LDUFD)                                 DSIO    17
      C                                                                        DSIO    18
            RETURN                                                             DSIO    19
            END                                                                DSIO    20
```

```
       SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS     DEF LINE     REFERENCES
    3  DSIO          3           18

VARIABLES       SN  TYPE          RELOCATION
    0  DSION        REAL             F.P.        REFS      15    DEFINED       3
    0  DSIONS       REAL             DSIO2       REFS      10       15
    0  INCFIL       INTEGER          F.P.        REFS      15    DEFINED       3
    0  KGEN         INTEGER          F.P.        REFS      15    DEFINED       3
    0  LDUF         INTEGER          DSIO1       REFS       9       15
    1  LDUFD        INTEGER          DSIO1       REFS       9       15
    0  LOCFIL       INTEGER          F.P.        REFS      15    DEFINED       3
    2  NDUF         INTEGER          DSIO1       REFS       9       15
    0  NFILE        INTEGER          F.P.        REFS      15    DEFINED       3
    0  NTAPE        INTEGER          F.P.        REFS      15    DEFINED       3

EXTERNALS           TYPE   ARGS        REFERENCES
       TSIO                 10             15

COMMON BLOCKS    LENGTH     MEMBERS - BIAS NAME(LENGTH)
       DSIO1        3               0 LDUF    (1)            1 LDUFD  (1)             2 NDUF    (1)
       DSIO2        1               0 DSIONS (1)

STATISTICS
  PROGRAM LENGTH                33B       27
  CM LABELED COMMON LENGTH       4B        4
        52000B CM USED
```

```
      C45700 SUB. FSIO (SEARCH FOR FORTRAN SEQUENTIAL I/O UNITS AND FILES)    FSIO      2
      C                                                                       FSIO      3
            SUBROUTINE FSIO (FSION,NTAPE,NFILE,INCFIL,LOCFIL,KGEN)            FSIO      4
      C                                                                       FSIO      5
      CIBM  BEGINNING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS     FSIO      6
      C     DOUBLE PRECISION FSIONS,FSION                                     FSIO      7
      CIBM  ENDING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS        FSIO      8
      C                                                                       FSIO      9
            COMMON /FSIO1 / LFUF   ,LFUFD ,NFUF                               FSIO     10
            COMMON /FSIO2 / FSIONS                                            FSIO     11
      C                                                                       FSIO     12
      C                                                                       FSIO     13
      C SEARCH FOR FORTRAN (FSIO) UNIT AND FILE NUMBERS                        FSIO     14
      C                                                                       FSIO     15
            CALL TSIO (FSION,NTAPE,NFILE,INCFIL,LOCFIL,KGEN                   FSIO     16
           1          ,FSIONS,NFUF,LFUF,LFUFD)                                FSIO     17
      C                                                                       FSIO     18
            RETURN                                                            FSIO     19
            END                                                               FSIO     20


    SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS      DEF LINE      REFERENCES
   3  FSIO           3             18

VARIABLES      SN   TYPE            RELOCATION
    O  FSION        REAL                F.P.         REFS          15    DEFINED          3
    O  FSIONS       REAL               FSIO2         REFS          10         15
    O  INCFIL       INTEGER             F.P.         REFS          15    DEFINED          3
    O  KGEN         INTEGER             F.P.         REFS          15    DEFINED          3
    O  LFUF         INTEGER            FSIO1         REFS           9         15
    1  LFUFD        INTEGER            FSIO1         REFS           9         15
    O  LOCFIL       INTEGER             F.P.         REFS          15    DEFINED          3
    O  NFILE        INTEGER             F.P.         REFS          15    DEFINED          3
    2  NFUF         INTEGER            FSIO1         REFS           9         15
    O  NTAPE        INTEGER             F.P.         REFS          15    DEFINED          3

EXTERNALS             TYPE   ARGS         REFERENCES
      TSIO                     10               15

COMMON BLOCKS    LENGTH      MEMBERS - BIAS NAME(LENGTH)
      FSIO1         3                  O LFUF    (1)              1 LFUFD   (1)                 2 NFUF    (1)
      FSIO2         1                  O FSIONS (1)

STATISTICS
  PROGRAM LENGTH                   33B        27
  CM LABELED COMMON LENGTH          4B         4
        52000B CM USED
```

```
VARIABLES      SN  TYPE           RELOCATION
                                                74          76          77          79          82
     0  NAME        INTEGER   ARRAY     F.P.    REFS        58          73          74          88   DEFINED      51
     0  NFILE       INTEGER             F.P.    REFS        70          71          88   DEFINED      51
    10  NO2LAB      INTEGER   ARRAY     PUTGET  REFS        59          61
     0  NTAPE       INTEGER             F.P.    REFS        71          83          88   DEFINED      51
     0  PNAME       REAL                F.P.    REFS        88   DEFINED          51

EXTERNALS             TYPE   ARGS       REFERENCES
        DATE                   1            81
        DFIND                  2            71
        DWRITE                 3            83
        PLABEL                 8            88

STATEMENT LABELS                 DEF LINE   REFERENCES
    0  9             INACTIVE       71          70
   14  10                           73          2*70

COMMON BLOCKS    LENGTH      MEMBERS - BIAS NAME(LENGTH)
        PUTGET       10                 0 LABEL   (8)                  8 NO2LAB (2)

STATISTICS
  PROGRAM LENGTH                  75B        61
  CM LABELED COMMON LENGTH        12B        10
          52000B CM USED
```

```
                DIMENSION NAME(1)                                                   PUDLAB    59
                DIMENSION NO2LAB(2)                                                 PUDLAB    60
  60      C                                                                         PUDLAB    61
                COMMON /PUTGET/ LABEL, NO2LAB                                       PUDLAB    62
          C                                                                         PUDLAB    63
          C                                                                         PUDLAB    64
          C PUT LABEL INFORMATION ON INPUT UNIT                                     PUDLAB    65
  65      C                                                                         PUDLAB    66
                DATA IBIN/3HBIN/                                                    PUDLAB    67
                DATA IBLANK /1H /                                                   PUDLAB    68
                LABEL(7) =  IBLANK                                                  PUDLAB    69
          C                                                                         PUDLAB    70
  70            IF (NFILE) 10, 10, 9                                                PUDLAB    71
              9 CALL DFIND (NTAPE,NFILE)                                            PUDLAB    72
          C  SET NAME                                                               PUDLAB    73
             10 LABEL(1)=NAME(1)                                                    PUDLAB    74
                LABEL(2)=NAME(2)                                                    PUDLAB    75
  75      C  SET ROW+COL COUNTS                                                     PUDLAB    76
                LABEL(3)=IROWS                                                      PUDLAB    77
                LABEL(4)=JCOLS                                                      PUDLAB    78
          C  DENOTE BINARY TAPE                                                     PUDLAB    79
                LABEL(5)=IBIN                                                       PUDLAB    80
  80      C  SET DATE                                                               PUDLAB    81
                CALL DATE(LABEL(6))                                                 PUDLAB    82
                LABEL(8)=0                                                          PUDLAB    83
                CALL DWRITE (NTAPE,LABEL(1),32)                                     PUDLAB    84
          C                                                                         PUDLAB    85
  85      C                                                                         PUDLAB    86
          C PREPARE LABEL INFORMATION FOR LISTING                                   PUDLAB    87
          C                                                                         PUDLAB    88
                CALL PLABEL (PNAME,6HPUDLAB,NTAPE,NAME,NFILE,IROWS,JCOLS,4HDSIO)    PUDLAB    89
          C                                                                         PUDLAB    90
  90            RETURN                                                              PUDLAB    91
                END                                                                 PUDLAB    92
```

```
CARD NR. SEVERITY  DETAILS    DIAGNOSIS OF PROBLEM

   74       I       NAME      ARRAY REFERENCE OUTSIDE DIMENSION BOUNDS.
```

```
      SYMBOLIC REFERENCE MAP (R=3)

 ENTRY POINTS     DEF LINE     REFERENCES
     3  PUDLAB        51          90

 VARIABLES      SN  TYPE            RELOCATION
    66  IBIN        INTEGER                       REFS       79    DEFINED      66
    67  IBLANK      INTEGER                       REFS       68    DEFINED      67
     0  IROWS       INTEGER             F.P.      REFS       76         88   DEFINED      51
     0  JCOLS       INTEGER             F.P.      REFS       77         88   DEFINED      51
     0  LABEL       INTEGER      ARRAY  PUTGET    REFS       57         61        81      83   DEFINED      68      73
```

```
C45700. SUB. PUDLAB (PUT OSIO LABEL ON TAPE)                            PUDLAB    2
C                                                                       PUDLAB    3
C*********************************************************************** PUDLAB    4
C                                                                     * PUDLAB    5
C***  SUBROUTINE PUDLAB ************************************************ PUDLAB    6
C                                                                     * PUDLAB    7
C***  COMPUTER VERSION  ************************************************ PUDLAB    8
C     ----------------                                                * PUDLAB    9
C     IBM COMPUTER PROGRAM VERSION                                    * PUDLAB   10
C                                                                     * PUDLAB   11
C     FORTRAN STATEMENTS CONTAINED WITHIN THE TWO CARDS IDENTIFIED    * PUDLAB   12
C     BY CIBM IN COLUMNS ONE TO FOUR ARE ASSOCIATED WITH THE IBM      * PUDLAB   13
C     COMPUTER AND SHOULD BE LEFT BLANK.                              * PUDLAB   14
C                                                                     * PUDLAB   15
C     CDC COMPUTER PROGRAM VERSION                                    * PUDLAB   16
C                                                                     * PUDLAB   17
C     FORTRAN STATEMENTS CONTAINED WITHIN THE TWO CARDS IDENTIFIED    * PUDLAB   18
C     BY CIBM IN COLUMNS ONE TO FOUR ARE ASSOCIATED WITH THE IBM      * PUDLAB   19
C     COMPUTER AND SHOULD HAVE A C IN COLUMN ONE.                     * PUDLAB   20
C                                                                     * PUDLAB   21
C***  OBJECTIVE  ******************************************************* PUDLAB   22
C     ---------                                                       * PUDLAB   23
C     PUTS A LABEL ON A PROGRAMMER CHOSEN DATA SET.                   * PUDLAB   24
C                                                                     * PUDLAB   25
C***  INPUT/OUTPUT  **************************************************** PUDLAB   26
C     ------------                                                    * PUDLAB   27
C     THE SUBROUTINE RECEIVES FROM THE CALLING ROUTINE THE MATRIX NAME,* PUDLAB   28
C     SIZE, AND THE UNIT NUMBER.  IF DESIRED, THE                     * PUDLAB   29
C     PROGRAM WILL PRINT OUT THIS SAME INFORMATION.                   * PUDLAB   30
C                                                                     * PUDLAB   31
C***  SUMMARY OF SYMBOLS  ********************************************** PUDLAB   32
C     ------------------                                              * PUDLAB   33
C.... IROWS ........ INPUT                                            * PUDLAB   34
C     NUMBER OF ROWS OF THE MATRIX.                                   * PUDLAB   35
C                                                                     * PUDLAB   36
C.... JCOLS ........ INPUT                                            * PUDLAB   37
C     NUMBER OF COLUMNS OF THE MATRIX.                                * PUDLAB   38
C                                                                     * PUDLAB   39
C.... NAME(I) ...... INPUT                                            * PUDLAB   40
C     NAME OF MATRIX MADE UP OF TWO ALPHAMERIC WORDS.                 * PUDLAB   41
C                                                                     * PUDLAB   42
C.... NTAPE ........ INPUT                                            * PUDLAB   43
C     DATA SET UNIT FOR STORING THE MATRIX.                           * PUDLAB   44
C                                                                     * PUDLAB   45
C***  ERROR MESSAGES  ************************************************** PUDLAB   46
C     --------------                                                  * PUDLAB   47
C     NONE.                                                           * PUDLAB   48
C                                                                     * PUDLAB   49
C*********************************************************************** PUDLAB   50
C                                                                       PUDLAB   51
      SUBROUTINE PUDLAB (PNAME,NTAPE,NAME,NFILE,IROWS,JCOLS)            PUDLAB   52
C                                                                       PUDLAB   53
CIBM  BEGINNING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS     PUDLAB   54
C     DOUBLE PRECISION PNAME                                            PUDLAB   55
CIBM  ENDING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS        PUDLAB   56
C                                                                       PUDLAB   57
```

```
EXTERNALS           TYPE   ARGS         REFERENCES
      PLABEL                  8              80

STATEMENT LABELS                DEF LINE   REFERENCES
    0  9            INACTIVE       69          68
   13  10                          70         2*68

COMMON BLOCKS   LENGTH     MEMBERS - BIAS NAME(LENGTH)
      PUTGET       10                 0 LABEL  (8)                   8 NO2LAB (2)

STATISTICS
  PROGRAM LENGTH                    76B       62
  CM LABELED COMMON LENGTH          12B       10
         52000B CM USED
```

```
              C                                                                   GEDLAB     59
                     DIMENSION LABEL(8)                                           GEDLAB     60
   60                DIMENSION NAME(1)                                            GEDLAB     61
                     DIMENSION NO2LAB(2)                                          GEDLAB     62
              C                                                                   GEDLAB     63
                     COMMON /PUTGET/ LABEL, NO2LAB                                GEDLAB     64
              C                                                                   GEDLAB     65
   65         C                                                                   GEDLAB     66
              C GET LABEL INFORMATION FROM OUTPUT UNIT                            GEDLAB     67
              C                                                                   GEDLAB     68
                     IF (NFILE) 10, 10, 9                                         GEDLAB     69
                   9 CALL DFIND (NTAPE,NFILE)                                     GEDLAB     70
   70             10 CALL DREAD (NTAPE,LABEL(1),32)                               GEDLAB     71
                     NAME(1)=  LABEL(1)                                           GEDLAB     72
                     NAME(2)=  LABEL(2)                                           GEDLAB     73
                     IROWS  =  LABEL(3)                                           GEDLAB     74
                     JCOLS  =  LABEL(4)                                           GEDLAB     75
   75                IF (LABEL(8).EQ.2) CALL DREAD (NTAPE,NO2LAB(1),8)            GEDLAB     76
              C                                                                   GEDLAB     77
              C                                                                   GEDLAB     78
              C PREPARE LABEL INFORMATION FOR LISTING                             GEDLAB     79
              C                                                                   GEDLAB     80
   80                CALL PLABEL (PNAME,6HGEDLAB,NTAPE,NAME,NFILE,IROWS,JCOLS,4HDSIO)  GEDLAB     81
              C                                                                   GEDLAB     82
                     RETURN                                                       GEDLAB     83
                     END                                                          GEDLAB     84


CARD NR. SEVERITY  DETAILS    DIAGNOSIS OF PROBLEM

   72       I       NAME       ARRAY REFERENCE OUTSIDE DIMENSION BOUNDS.



      SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS      DEF LINE     REFERENCES
   3 GEDLAB          53           82

VARIABLES      SN  TYPE             RELOCATION
   O  IROWS        INTEGER                 F.P.        REFS       80    DEFINED       53        73
   O  JCOLS        INTEGER                 F.P.        REFS       80    DEFINED       53        74
   O  LABEL        INTEGER     ARRAY    PUTGET         REFS       59         63       70        71        72        73        74
                                                        75
   O  NAME         INTEGER     ARRAY       F.P.        REFS       60         80  DEFINED        53        71        72
   O  NFILE        INTEGER                 F.P.        REFS       68         69       80   DEFINED        53
  10  NO2LAB       INTEGER     ARRAY    PUTGET         REFS       61         63       75
   O  NTAPE        INTEGER                 F.P.        REFS       69         70       75        80   DEFINED        53
   O  PNAME        REAL                    F.P.        REFS       80    DEFINED       53

EXTERNALS          TYPE    ARGS        REFERENCES
      DFIND                  2              69
      DREAD                  3              70         75
```

```
C45700. SUB  GEDLAB (GET DSIO LABEL FROM TAPE)                          GEDLAB     2
C                                                                       GEDLAB     3
C*********************************************************************** GEDLAB     4
C                                                                     * GEDLAB     5
C***  SUBROUTINE GEDLAB  *********************************************** GEDLAB     6
C                                                                     * GEDLAB     7
C***  COMPUTER VERSION  ************************************************ GEDLAB     8
C     ----------------                                                * GEDLAB     9
C     IBM COMPUTER PROGRAM VERSION                                    * GEDLAB    10
C                                                                     * GEDLAB    11
C     FORTRAN STATEMENTS CONTAINED WITHIN THE TWO CARDS IDENTIFIED    * GEDLAB    12
C     BY CIBM IN COLUMNS ONE TO FOUR ARE ASSOCIATED WITH THE IBM      * GEDLAB    13
C     COMPUTER AND SHOULD BE LEFT BLANK.                              * GEDLAB    14
C                                                                     * GEDLAB    15
C     CDC COMPUTER PROGRAM VERSION                                    * GEDLAB    16
C                                                                     * GEDLAB    17
C     FORTRAN STATEMENTS CONTAINED WITHIN THE TWO CARDS IDENTIFIED    * GEDLAB    18
C     BY CIBM IN COLUMNS ONE TO FOUR ARE ASSOCIATED WITH THE IBM      * GEDLAB    19
C     COMPUTER AND SHOULD HAVE A C IN COLUMN ONE.                     * GEDLAB    20
C                                                                     * GEDLAB    21
C***  OBJECTIVE  ******************************************************* GEDLAB    22
C     ---------                                                       * GEDLAB    23
C     GETS THE LABEL FROM A PROGRAMMER CHOSEN DATA SET.               * GEDLAB    24
C                                                                     * GEDLAB    25
C***  INPUT/OUTPUT  **************************************************** GEDLAB    26
C     ------------                                                    * GEDLAB    27
C     USING THE INFORMATION SUPPLIED BY THE CALLING ROUTINE THIS      * GEDLAB    28
C     SUBROUTINE WILL POSITION THE TAPE AND READ THE MATRIX LABEL FROM * GEDLAB    29
C     THE SPECIFIED DATA SET.                                         * GEDLAB    30
C                                                                     * GEDLAB    31
C***  SUMMARY OF SYMBOLS  ********************************************** GEDLAB    32
C     ------------------                                              * GEDLAB    33
C                                                                     * GEDLAB    34
C.... IROWS ........ OUTPUT                                           * GEDLAB    35
C     NUMBER OF ROWS IN THE MATRIX.                                   * GEDLAB    36
C                                                                     * GEDLAB    37
C.... JCOLS .... ... OUTPUT                                           * GEDLAB    38
C     NUMBER OF COLUMNS IN THE MATRIX.                                * GEDLAB    39
C                                                                     * GEDLAB    40
C.... NAME(I) ...... OUTPUT                                           * GEDLAB    41
C     NAME OF MATRIX MADE UP OF TWO ALPHAMERIC WORDS.                 * GEDLAB    42
C                                                                     * GEDLAB    43
C.... NTAPE .. ..... INPUT                                            * GEDLAB    44
C     DATA SET UNIT FROM WHICH THE LABEL AND THE SIZE OF THE MATRIX   * GEDLAB    45
C     IS TO BE READ.                                                  * GEDLAB    46
C                                                                     * GEDLAB    47
C***  ERROR MESSAGES  ************************************************** GEDLAB    48
C     --------------                                                  * GEDLAB    49
C     NONE.                                                           * GEDLAB    50
C                                                                     * GEDLAB    51
C*********************************************************************** GEDLAB    52
C                                                                       GEDLAB    53
      SUBROUTINE GEDLAB (PNAME,NTAPE,NAME,NFILE,IROWS,JCOLS)            GEDLAB    54
C                                                                       GEDLAB    55
CIBM  BEGINNING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS     GEDLAB    56
C     DOUBLE PRECISION PNAME                                            GEDLAB    57
```

```
STATISTICS
  PROGRAM LENGTH              133B      91
  CM LABELED COMMON LENGTH     25B      21
        52000B CM USED
```

```
          C                                                                    TIMEB       2
          C45700. SUB. TIMEB(COMPUTER TIME VERSION B)                          TIMEB       3
          C                                                                    TIMEB       4
                SUBROUTINE TIMEB (NCHAR,TEXT)                                  TIMEB       5
          C                                                                    TIMEB       6
                DIMENSION CHAR(1)                                              TIMEB       7
                DIMENSION TEXT(1)                                              TIMEB       8
          C                                                                    TIMEB       9
                COMMON /MESAG / KMESAG,KTITLE,KTIME ,KTIMEL                    TIMEB      10
          C                                                                    TIMEB      11
                IF (KTIMEL .EQ. 1) GO TO 100                                   TIMEB      12
                CALL TIMEA (KTITLE,KTIME,1,TDUMMY,NCHAR,TEXT)                  TIMEB      13
            100 CONTINUE                                                       TIMEB      14
          C                                                                    TIMEB      15
                RETURN                                                         TIMEB      16
                END                                                            TIMEB      17
```

```
       SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS      DEF LINE      REFERENCES
    3  TIMEB           4           15

VARIABLES      SN  TYPE           RELOCATION
   25  CHAR        REAL       *UNDEF                 REFS         6
    0  KMESAG      INTEGER              MESAG        REFS         9
    2  KTIME       INTEGER              MESAG        REFS         9        12
    3  KTIMEL      INTEGER              MESAG        REFS         9        11
    1  KTITLE      INTEGER              MESAG        REFS         9        12
    0  NCHAR       INTEGER               F.P.        REFS        12   DEFINED        4
   24  TDUMMY    * REAL                              REF'        12
    0  TEXT        REAL        ARRAY     F.P.        REFS         7        12    DEFINED        4

EXTERNALS           TYPE    ARGS         REFERENCES
       TIMEA                  6              12

STATEMENT LABELS               DEF LINE   REFERENCES
   13  100                        13          11

COMMON BLOCKS    LENGTH      MEMBERS - BIAS NAME(LENGTH)
       MESAG         4               0 KMESAG (1)             1 KTITLE (1)              2 KTIME  (1)
                                     3 KTIMEL (1)

STATISTICS
  PROGRAM LENGTH                  26B       22
  CM LABELED COMMON LENGTH         4B        4
         52000B CM USED
```

```
      C                                                                          PROGNA     2
      C45700, SUB. PROGNA (PROGRAM NAME CONSISTING OF TWO WORDS - VERSION B)    PROGNA     3
      C                                                                          PROGNA     4
            SUBROUTINE PROGNA (WORD1,WORD2)                                      PROGNA     5
      C                                                                          PROGNA     6
            DIMENSION TSH(1)                                                     PROGNA     7
      C                                                                          PROGNA     8
            COMMON /CTSH  / KTSH  ,LTSH  ,TSH                                    PROGNA     9
      C                                                                          PROGNA    10
            L1      =  LTSH - 1                                                  PROGNA    11
            L2      =  LTSH                                                      PROGNA    12
            TSH(L1)=  WORD1                                                      PROGNA    13
            TSH(L2)=  WORD2                                                      PROGNA    14
      C                                                                          PROGNA    15
            RETURN                                                               PROGNA    16
            END                                                                  PROGNA    17
```

```
       SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS      DEF LINE      REFERENCES
    3  PROGNA         4            15

VARIABLES      SN  TYPE            RELOCATION
    0  KTSH         INTEGER              CTSH          REFS           8
    1  LTSH         INTEGER              CTSH          REFS           8          10          11
   14  L1           INTEGER                            REFS          12     DEFINED          10
   15  L2           INTEGER                            REFS          13     DEFINED          11
    2  TSH          REAL          ARRAY  CTSH          REFS           6           8     DEFINED          12          13
    0  WORD1        REAL                  F.P.         REFS          12     DEFINED           4
    0  WORD2        REAL                  F.P.         REFS          13     DEFINED           4

COMMON BLOCKS    LENGTH      MEMBERS - BIAS NAME(LENGTH)
       CTSH          3                 0 KTSH    (1)                1 LTSH    (1)                2 TSH    (1)

STATISTICS
  PROGRAM LENGTH                16B        14
  CM LABELED COMMON LENGTH       3B         3
        52000B CM USED
```

```
C                                                                          PRMAT1    2
      SUBROUTINE PRMAT1(IUNIT,IFILE,WORK,LOWTRI,IUOUT,LWIDE,NCHAR,A)       PRMAT1    3
C                                                                          PRMAT1    4
C                                                                          PRMAT1    5
C THIS ROUTINE WRITES OUT ALL THE ELEMENTS (INCLUDING ZEROES) OF A         PRMAT1    6
C MATRIX STORED (IN ROW SORT) ON AN I/O UNIT.                              PRMAT1    7
C                                                                          PRMAT1    8
C     IUNIT - UNIT ON WHICH MATRIX RESIDES                                 PRMAT1    9
C     IFILE - FILE ON WHICH MATRIX RESIDES                                 PRMAT1   10
C     WORK  - STORAGE LOCATION IN CORE LARGE ENOUGH TO CONTAIN A ROW       PRMAT1   11
C             OF THE MATRIX                                                PRMAT1   12
C                                                                          PRMAT1   13
C     LOWTRI=0 WRITE OUT ENTIRE MATRIX                                     PRMAT1   14
C           =1 WRITE OUT LOWER TRIANGLE (OF SQUARE MATRIX)                 PRMAT1   15
C                                                                          PRMAT1   16
C     IUOUT - UNIT TO BE WRITTEN ON                                        PRMAT1   17
C     LWIDE - NUMBER OF MATRIX ELEMENTS (NOT TO EXCEED 7) PER ROW OF       PRMAT1   18
C             OUTPUT                                                       PRMAT1   19
C     NCHAR - NUMBER OF CHARACTERS IN DESCRIPTIVE COMMENT                  PRMAT1   20
C     A     - DESCRIPTIVE COMMENT                                          PRMAT1   21
C                                                                          PRMAT1   22
C                                                                          PRMAT1   23
      DIMENSION WORK(1),NAME(2),MES(4,2)                                   PRMAT1   24
      DIMENSION HEAD(2)                                                    PRMAT1   25
      DIMENSION A(1)                                                       PRMAT1   26
C                                                                          PRMAT1   27
      COMMON /CLIST / KOUNT,KPAGE,LINES,LINEST,KLABEL,KTPAGE,NPAGE         PRMAT1   28
     1              ,KBPAGE,LINESG,KOUNTH,KOUNTI                           PRMAT1   29
      COMMON /COMPUT/ KOMPUT,NCHARW                                        PRMAT1   30
C                                                                          PRMAT1   31
      DATA MES/4HFULL,4H MAT,4HRIX ,4H    ,                                PRMAT1   32
     1         4HLOWE,4HR TR,4HIANG,4HLE  /                                PRMAT1   33
      DATA HEAD/4H   V,4HALUE/                                             PRMAT1   34
C                                                                          PRMAT1   35
C                                                                          PRMAT1   36
      NWIDE=LWIDE                                                          PRMAT1   37
      IF(NWIDE.GT.7) NWIDE=7                                               PRMAT1   38
C                                                                          PRMAT1   39
      CALL GEDLAB(6HPRMAT1,IUNIT,NAME,IFILE,KROW,KCOL)                     PRMAT1   40
      KLUTRI=LOWTRI                                                        PRMAT1   41
      IF(KROW.NE.KCOL) KLUTRI=0                                            PRMAT1   42
      MTRI=KLUTRI+1                                                        PRMAT1   43
      JMAX=KCOL                                                            PRMAT1   44
C                                                                          PRMAT1   45
      NWORDS=(NCHAR-1)/NCHARW + 1                                          PRMAT1   46
      NLINES=(NCHAR-1)/120 + 1                                             PRMAT1   47
C                                                                          PRMAT1   48
      KOUNT=LINES                                                          PRMAT1   49
C                                                                          PRMAT1   50
      DO 100 I=1,KROW                                                      PRMAT1   51
      IR=I                                                                 PRMAT1   52
      IF(KLUTRI.EQ.1) JMAX=IR                                              PRMAT1   53
      CALL GETROW(IUNIT,1,WORK,KCOL)                                       PRMAT1   54
      JEND=0                                                               PRMAT1   55
C                                                                          PRMAT1   56
   20 CONTINUE                                                             PRMAT1   57
      JBEG=JEND+1                                                          PRMAT1   58
```

```
            JEND=JBEG+NWIDE-1                                                PRMAT1      59
            IF(JEND.GT.JMAX) JEND=JMAX                                       PRMAT1      60
      C                                                                      PRMAT1      61
            CALL TITLES(2)                                                   PRMAT1      62
            IF(KOUNT.GT.KOUNTH) GO TO 30                                     PRMAT1      63
            WRITE(IUOUT,900) NAME,KROW,KCOL,(MES(L,MTRI),L=1,4)              PRMAT1      64
            KOUNT=KOUNT+2                                                    PRMAT1      65
            IF(NCHAR.LE.O) GO TO 25                                          PRMAT1      66
            WRITE(IUOUT,902) (A(L),L=1,NWORDS)                               PRMAT1      67
            KOUNT=KOUNT+NLINES                                               PRMAT1      68
         25 CONTINUE                                                         PRMAT1      69
            WRITE(IUOUT,903) (HEAD, L=1,NWIDE)                               PRMAT1      70
            KOUNT=KOUNT+3                                                    PRMAT1      71
      C                                                                      PRMAT1      72
         30 CONTINUE                                                         PRMAT1      73
            WRITE(IUOUT,901) IR,JBEG,(WORK(J),J=JBEG,JEND)                   PRMAT1      74
            KOUNT=KOUNT+1                                                    PRMAT1      75
      C                                                                      PRMAT1      76
            IF(JEND.LT.JMAX) GO TO 20                                        PRMAT1      77
      C                                                                      PRMAT1      78
            LREST=LINES-KOUNT                                                PRMAT1      79
            IF(LREST.LT.2) GO TO 40                                          PRMAT1      80
            CALL PLB(1,2,IUOUT)                                              PRMAT1      81
            KOUNT=KOUNT+2                                                    PRMAT1      82
            GO TO 100                                                        PRMAT1      83
         40 KOUNT=LINES                                                      PRMAT1      84
      C                                                                      PRMAT1      85
        100 CONTINUE                                                         PRMAT1      86
      C                                                                      PRMAT1      87
            CALL DCLOSE(IUNIT)                                               PRMAT1      88
      C                                                                      PRMAT1      89
        900 FORMAT(/,10X,13HMATRIX NAME= ,2A4,2X,1H(,I4,3H X ,I4,1H),2X,     PRMAT1      90
           1       6HPRINT ,4A4)                                             PRMAT1      91
        901 FORMAT(10X,2I5,7(1PE15.6))                                       PRMAT1      92
      CIBM                                                                   PRMAT1      93
      C 902 FORMAT(10X,30A4)                                                 PRMAT1      94
      CIBM                                                                   PRMAT1      95
      CCDC                                                                   PRMAT1      96
        902 FORMAT (10X, 12A10)                                              PRMAT1      97
      CCDC                                                                   PRMAT1      98
        903 FORMAT(/,10X,   10H  ROW  COL,7(7X,2A4),/)                       PRMAT1      99
      C                                                                      PRMAT1     100
            RETURN                                                           PRMAT1     101
            END                                                              PRMAT1     102
```

SYMBOLIC REFERENCE MAP (R=3)

```
ENTRY POINTS      DEF LINE      REFERENCES
   3  PRMAT1          2           100

VARIABLES      SN  TYPE           RELOCATION
   O  A            REAL       ARRAY     F.P.        REFS        25        66    DEFINED        2
```

```
VARIABLES     SN  TYPE          RELOCATION
  251  I          INTEGER                       REFS       51   DEFINED      50
    0  IFILE      INTEGER             F.P.      REFS       39   DEFINED       2
  252  IR         INTEGER                       REFS       52        73   DEFINED      51
    0  IUNIT      INTEGER             F.P.      REFS       39        53        87   DEFINED       2
    0  IUOUT      INTEGER             F.P.      REFS       80   DEFINED       2   I/O REFS     63        66        69
                                                  73
  256  J          INTEGER                       REFS       73   DEFINED      73
  254  JBEG       INTEGER                       REFS       58      2*73   DEFINED      57
  253  JEND       INTEGER                       REFS       57        59        73        76   DEFINED      54        58
                                                  59
  246  JMAX       INTEGER                       REFS     2*59        76   DEFINED      43        52
    7  KBPAGE     INTEGER            CLIST      REFS       27
  243  KCOL       INTEGER                       REFS       39        41        43        53        63
    4  KLABEL     INTEGER            CLIST      REFS       27
  244  KLUTRI     INTEGER                       REFS       42        52   DEFINED      40        41
    0  KOMPUT     INTEGER            COMPUT     REFS       29
    0  KOUNT      INTEGER            CLIST      REFS       27        62        64        67        70        74        78
                                                  81   DEFINED       48        64        67        70        74        81
                                                  83
   11  KOUNTH     INTEGER            CLIST      REFS       27        62
   12  KOUNTI     INTEGER            CLIST      REFS       27
    1  KPAGE      INTEGER            CLIST      REFS       27
  242  KROW       INTEGER                       REFS       39        41        50        63
    5  KTPAGE     INTEGER            CLIST      REFS       27
  255  L          INTEGER                       REFS       63        66   DEFINED      63        66        69
    2  LINES      INTEGER            CLIST      REFS       27        48        78        83
   10  LINESG     INTEGER            CLIST      REFS       27
    3  LINEST     INTEGER            CLIST      REFS       27
    0  LOWTRI     INTEGER             F.P.      REFS       40   DEFINED       2
  257  LREST      INTEGER                       REFS       79   DEFINED      78
    0  LWIDE      INTEGER             F.P.      REFS       36   DEFINED       2
  262  MES        INTEGER    ARRAY              REFS       23        63   DEFINED      31
  245  MTRI       INTEGER                       REFS       63   DEFINED      42
  260  NAME       INTEGER    ARRAY              REFS       23        39        63
    0  NCHAR      INTEGER             F.P.      REFS       45        46        65   DEFINED       2
    1  NCHARW     INTEGER            COMPUT     REFS       29        45
  250  NLINES     INTEGER                       REFS       67   DEFINED      46
    6  NPAGE      INTEGER            CLIST      REFS       27
  241  NWIDE      INTEGER                       REFS       37        58        69   DEFINED      36        37
  247  NWORDS     INTEGER                       REFS       66   DEFINED      45
    0  WORK       REAL       ARRAY    F.P.      REFS       23        53        73   DEFINED       2
       VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS         TYPE    ARGS        REFERENCES
       DCLOSE               1            87
       GEDLAB               6            39
       GETROW               4            53
       PLB                  3            80
       TITLES               1            61

STATEMENT LABELS              DEF LINE    REFERENCES
   46  20                         56          76
  100  25                         68          65
  112  30                         72          62
  134  40                         83          79
  136  100                        85          50         82
  217  900        FMT             89          63
```

```
STATEMENT LABELS                DEF LINE   REFERENCES
  226  901      FMT                 91         73
  231  902      FMT                 96         66
  233  903      FMT                 98         69

LOOPS  LABEL    INDEX      FROM-TO    LENGTH     PROPERTIES
   35  100      I           50 85       104B               EXT REFS  NOT INNER
  103           L           69 69        4B                EXT REFS

COMMON BLOCKS   LENGTH     MEMBERS - BIAS NAME(LENGTH)
       CLIST        11                0 KOUNT   (1)             1 KPAGE  (1)            2 LINES  (1)
                                      3 LINEST  (1)             4 KLABEL (1)            5 KTPAGE (1)
                                      6 NPAGE   (1)             7 KBPAGE (1)            8 LINESG (1)
                                      9 KOUNTH  (1)            10 KOUNTI (1)
       COMPUT        2                0 KOMPUT  (1)             1 NCHARW (1)

STATISTICS
  PROGRAM LENGTH                 305B      197
  CM LABELED COMMON LENGTH        15B       13
          52000B CM USED
```

```
C                                                                         PRMAT2     2
      SUBROUTINE PRMAT2(IUNIT,IFILE,WORK,LOWTRI,IUOUT,LWIDE,NCHAR,A)      PRMAT2     3
C                                                                         PRMAT2     4
C                                                                         PRMAT2     5
C THIS ROUTINE WRITES OUT THE NON-ZERO ELEMENTS OF A MATRIX STORED (IN   PRMAT2     6
C ROW SORT) ON AN I/O UNIT.                                               PRMAT2     7
C                                                                         PRMAT2     8
C     IUNIT - UNIT ON WHICH MATRIX RESIDES                                PRMAT2     9
C     IFILE - FILE ON WHICH MATRIX RESIDES                                PRMAT2    10
C     WORK  - STORAGE LOCATION IN CORE LARGE ENOUGH TO CONTAIN A ROW      PRMAT2    11
C             OF THE MATRIX                                               PRMAT2    12
C                                                                         PRMAT2    13
C     LOWTRI=0 WRITE OUT ENTIRE MATRIX                                    PRMAT2    14
C           =1 WRITE OUT LOWER TRIANGLE (OF SQUARE MATRIX)                PRMAT2    15
C                                                                         PRMAT2    16
C     IUOUT - UNIT TO BE WRITTEN ON                                       PRMAT2    17
C     LWIDE - NUMBER OF MATRIX ELEMENTS (NOT TO EXCEED 4) PER ROW OF      PRMAT2    18
C             OUTPUT                                                      PRMAT2    19
C     NCHAR - NUMBER OF CHARACTERS IN DESCRIPTIVE COMMENT                 PRMAT2    20
C     A     - DESCRIPTIVE COMMENT                                         PRMAT2    21
C                                                                         PRMAT2    22
C                                                                         PRMAT2    23
      DIMENSION WORK(1),NAME(2),ICOL(4),VALUE(4),MES(4,2)                 PRMAT2    24
      DIMENSION HEAD1(2),HEAD2(2)                                         PRMAT2    25
      DIMENSION A(1)                                                      PRMAT2    26
C                                                                         PRMAT2    27
      COMMON /CLIST / KOUNT,KPAGE,LINES,LINEST,KLABEL,KTPAGE,NPAGE        PRMAT2    28
     1               ,KBPAGE,LINESG,KOUNTH,KOUNTI                         PRMAT2    29
      COMMON /COMPUT/ KOMPUT,NCHARW                                       PRMAT2    30
C                                                                         PRMAT2    31
      DATA MES/4HFULL,4H MAT,4HRIX ,4H    ,                               PRMAT2    32
     1         4HLOWE,4HR TR,4HIANG,4HLE  /                               PRMAT2    33
      DATA HEAD1/4HROW ,4H COL/                                           PRMAT2    34
      DATA HEAD2/4H   V,4HALUE/                                           PRMAT2    35
C                                                                         PRMAT2    36
C                                                                         PRMAT2    37
      NWIDE=LWIDE                                                         PRMAT2    38
      IF(NWIDE.GT.4) NWIDE=4                                              PRMAT2    39
C                                                                         PRMAT2    40
      CALL GEDLAB(6HPRMAT2,IUNIT,NAME,IFILE,KROW,KCOL)                    PRMAT2    41
      KLUTRI=LOWTRI                                                       PRMAT2    42
      IF(KROW.NE.KCOL) KLUTRI=0                                           PRMAT2    43
      MTRI=KLUTRI+1                                                       PRMAT2    44
      JMAX=KCOL                                                           PRMAT2    45
C                                                                         PRMAT2    46
      NWORDS=(NCHAR-1)/NCHARW + 1                                         PRMAT2    47
      NLINES=(NCHAR-1)/120 + 1                                            PRMAT2    48
C                                                                         PRMAT2    49
      KOUNT=LINES                                                         PRMAT2    50
C                                                                         PRMAT2    51
      DO 100 I=1,KROW                                                     PRMAT2    52
      IR=I                                                                PRMAT2    53
      IF(KLUTRI.EQ.1) JMAX=IR                                             PRMAT2    54
      CALL GETROW(IUNIT,1,WORK,KCOL)                                      PRMAT2    55
      K=0                                                                 PRMAT2    56
      J=0                                                                 PRMAT2    57
```

```
   10 J=J+1
C
      IF(J.GT.JMAX.AND.K.GT.0) GO TO 20
      IF(J.GT.JMAX.AND.K.EQ.0) GO TO 40
      IF(WORK(J).EQ.0.0) GO TO 10
C
      K=K+1
      ICOL(K)=J
      VALUE(K)=WORK(J)
      IF(K.LT.NWIDE) GO TO 10
C
   20 CALL TITLES(2)
      IF(KOUNT.GT.KOUNTH) GO TO 30
      WRITE(IUOUT,900) NAME,KROW,KCOL,(MES(L,MTRI),L=1,4)
      KOUNT=KOUNT+2
      IF(NCHAR.LE.0) GO TO 25
      WRITE(IUOUT,902) (A(L),L=1,NWORDS)
      KOUNT=KOUNT+NLINES
   25 CONTINUE
      WRITE(IUOUT,903) ((HEAD1,HEAD2),L=1,NWIDE)
      KOUNT=KOUNT+3
   30 CONTINUE
      WRITE(IUOUT,901) ((IR,ICOL(L),VALUE(L)),L=1,K)
      KOUNT=KOUNT+1
      K=0
      GO TO 10
C
   40 IF(KOUNT.GE.LINES) GO TO 100
      CALL PLB(1,1,IUOUT)
      KOUNT=KOUNT+1
C
  100 CONTINUE
C
      CALL DCLOSE(IUNIT)
C
  900 FORMAT(/,10X,13HMATRIX NAME= ,2A4,2X,1H(,I4,3H X ,I4,1H),2X,
     1       6HPRINT ,4A4)
  901 FORMAT(10X,4(2I5,1PE15.6,4X))
CIBM
C 902 FORMAT(10X,30A4)
CIBM
CCDC
  902 FORMAT (10X, 12A10)
CCDC
  903 FORMAT(/,10X,4(2X,2A4,7X,2A4,4X),/)
C
      RETURN
      END
```

SYMBOLIC REFERENCE MAP (R=3)

```
ENTRY POINTS    DEF LINE     REFERENCES
   3  PRMAT2       2           104

VARIABLES     SN  TYPE           RELOCATION
    0  A          REAL      ARRAY     F.P.       REFS       25        74    DEFINED        2
  314  HEAD1      REAL      ARRAY                REFS       24        77    DEFINED       33
  316  HEAD2      REAL      ARRAY                REFS       24        77    DEFINED       34
  265  I          INTEGER                        REFS       52   DEFINED         51
  274  ICOL       INTEGER   ARRAY                REFS       23        80    DEFINED       65
    0  IFILE      INTEGER             F.P.       REFS       40   DEFINED          2
  266  IR         INTEGER                        REFS       53        80    DEFINED       52
    0  IUNIT      INTEGER             F.P.       REFS       40        54         91   DEFINED        2
    0  IUOUT      INTEGER             F.P.       REFS       86   DEFINED          2   I/O REFS      71        74        77
                                                   80
  270  J          INTEGER                        REFS       58        60         61       62        65        66
                                              DEFINED       56        58
  262  JMAX       INTEGER                        REFS       60        61    DEFINED       44        53
  267  K          INTEGER                        REFS       60        61         64       65        66        67        80
                                              DEFINED       55        64         82
    7  KBPAGE     INTEGER             CLIST      REFS       27
  257  KCOL       INTEGER                        REFS       40        42         44       54        71
    4  KLABEL     INTEGER             CLIST      REFS       27
  260  KLUTRI     INTEGER                        REFS       43        53    DEFINED       41        42
    0  KOMPUT     INTEGER             COMPUT     REFS       29
    0  KOUNT      INTEGER             CLIST      REFS       27        70         72       75        78        81        85
                                                   87  DEFINED        49         72       75        78        81        87
   11  KOUNTH     INTEGER             CLIST      REFS       27        70
   12  KOUNTI     INTEGER             CLIST      REFS       27
    1  KPAGE      INTEGER             CLIST      REFS       27
  256  KROW       INTEGER                        REFS       40        42         51       71
    5  KTPAGE     INTEGER             CLIST      REFS       27
  271  L          INTEGER                        REFS       71        74       2*80   DEFINED       71        74        77
                                                   80
    2  LINES      INTEGER             CLIST      REFS       27        49         85
   10  LINESG     INTEGER             CLIST      REFS       27
    3  LINEST     INTEGER             CLIST      REFS       27
    0  LOWTRI     INTEGER             F.P.       REFS       41   DEFINED          2
    0  LWIDE      INTEGER             F.P.       REFS       37   DEFINED          2
  304  MES        INTEGER   ARRAY                REFS       23        71    DEFINED       31
  261  MTRI       INTEGER                        REFS       71   DEFINED         43
  272  NAME       INTEGER   ARRAY                REFS       23        40         71
    0  NCHAR      INTEGER             F.P.       REFS       46        47         73   DEFINED        2
    1  NCHARW     INTEGER             COMPUT     REFS       29        46
  264  NLINES     INTEGER                        REFS       75   DEFINED         47
    6  NPAGE      INTEGER             CLIST      REFS       27
  255  NWIDE      INTEGER                        REFS       38        67         77   DEFINED       37        38
  263  NWORDS     INTEGER                        REFS       74   DEFINED         46
  300  VALUE      REAL      ARRAY                REFS       23        80    DEFINED       66
    0  WORK       REAL      ARRAY     F.P.       REFS       23        54         62       66   DEFINED         2
       VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS         TYPE    ARGS       REFERENCES
       DCLOSE               1            91
       GEDLAB               6            40
       GETROW               4            54
       PLB                  3            86
       TITLES               1            69
```

```
STATEMENT LABELS                 DEF LINE    REFERENCES
   47  10                           58          62         67         83
   61  20                           69          60
  105  25                           76          73
  117  30                           79          70
  137  40                           85          61
  146  100                          89          51         85
  232  900      FMT                 93          71
  241  901      FMT                 95          80
  245  902      FMT                100          74
  247  903      FMT                102          77

LOOPS  LABEL    INDEX     FROM-TO    LENGTH    PROPERTIES
   35  100      I          51 89      114B               EXT REFS  NOT INNER
  110           L          77 77        4B               EXT REFS
  122           L          80 80       11B               EXT REFS

COMMON BLOCKS   LENGTH     MEMBERS - BIAS NAME(LENGTH)
       CLIST        11               0 KOUNT  (1)                1 KPAGE  (1)          2 LINES  (1)
                                     3 LINEST (1)                4 KLABEL (1)          5 KTPAGE (1)
                                     6 NPAGE  (1)                7 KBPAGE (1)          8 LINESG (1)
                                     9 KOUNTH (1)               10 KOUNTI (1)
       COMPUT        2               0 KOMPUT (1)                1 NCHARW (1)

STATISTICS
  PROGRAM LENGTH                 331B      217
  CM LABELED COMMON LENGTH        15B       13
        52000B CM USED
```

```
      C45700. FUN  SCAPRO                                              SCAPRO    2
      C                                                                SCAPRO    3
      C*************************************************************** SCAPRO    4
      C                                                              * SCAPRO    5
      C***  FUNCTION   SCAPRO  *************************************** SCAPRO    6
      C                                                              * SCAPRO    7
      C***  OBJECTIVE  ************************************************ SCAPRO    8
      C     ---------                                                * SCAPRO    9
      C     ACCUMULATES PRODUCTS OF ROW AND COLUMN ELEMENTS OF MATRICES. * SCAPRO   10
      C                                                              * SCAPRO   11
      C***  INPUT/OUTPUT  ********************************************* SCAPRO   12
      C     ------------                                             * SCAPRO   13
      C                                                              * SCAPRO   14
      C***  SUMMARY OF SYMBOLS  *************************************** SCAPRO   15
      C     ------------------                                       * SCAPRO   16
      C                                                              * SCAPRO   17
      C***  ERROR MESSAGES  ******************************************* SCAPRO   18
      C     --------------                                           * SCAPRO   19
      C     NONE.                                                    * SCAPRO   20
      C                                                              * SCAPRO   21
      C*************************************************************** SCAPRO   22
      C                                                                SCAPRO   23
      C                                                                SCAPRO   24
            FUNCTION SCAPRO(X,Y,S,N,IX,IY)                             SCAPRO   25
      C  FOR ADDED ACCURACY ( AT A COST IN TIME ) ACTIVATE SEVERAL COMMENT SCAPRO 26
      C     CARDS AS SHOWN.  ( NOT RECOMMENDED FOR CDC 6000 MACHINES )  SCAPRO   27
            DIMENSION X(1),Y(1)                                        SCAPRO   28
      C  FOR D.P., ACTIVATE NEXT CARD.                                 SCAPRO   29
      C     DOUBLE PRECISION S,SCAPRO                                  SCAPRO   30
            IF (N) 120,120,100                                         SCAPRO   31
        100 JX = 1                                                     SCAPRO   32
            JY = 1                                                     SCAPRO   33
            DO 110  J = 1,N                                            SCAPRO   34
            S = S + X(JX)*Y(JY)                                        SCAPRO   35
      C  FOR D.P., REPLACE PREVIOUS CARD WITH NEXT CARD.               SCAPRO   36
      C     S = S + DBLE(X(JX)) * DBLE(Y(JY))                          SCAPRO   37
            JX = JX + IX                                               SCAPRO   38
        110 JY = JY + IY                                               SCAPRO   39
        120 SCAPRO = S                                                 SCAPRO   40
      C                                                                SCAPRO   41
            RETURN                                                     SCAPRO   42
            END                                                        SCAPRO   43
```

SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS	DEF LINE	REFERENCES
4 SCAPRO	24	41

VARIABLES	SN	TYPE	RELOCATION				
0 IX		INTEGER	F.P.	REFS	37	DEFINED	24
0 IY		INTEGER	F.P.	REFS	38	DEFINED	24
34 J	*	INTEGER		DEFINED	33		

```
VARIABLES      SN  TYPE          RELOCATION
   33  JY          INTEGER                          REFS         34         38    DEFINED        32         38
    O  N           INTEGER                 F P.     REFS         30         33    DEFINED        24
    O  S           REAL                    F P.     REFS         34         39    DEFINED        24         34
   31  SCAPRO      REAL                          DEFINED         39
    O  X           REAL          ARRAY     F.P      REFS         27         34    DEFINED        24
    O  Y           REAL          ARRAY     F P.     REFS         27         34    DEFINED        24

STATEMENT LABELS                DEF LINE   REFERENCES
    O  100         INACTIVE         31        3O
    O  110                          38        33
   27  120                          39       2*3O

LOOPS  LABEL     INDEX      FROM-TO     LENGTH    PROPERTIES
   21  110       J           33 38         4B       INSTACK

STATISTICS
  PROGRAM LENGTH                  40B        32
        52000B CM USED
```

```
C45700. FUN  DSQRTF (SQUARE ROOT)                                         DSQRTF     2
C                                                                         DSQRTF     3
      FUNCTION DSQRTF(ARG)                                                DSQRTF     4
C                                                                         DSQRTF     5
CIBM  BEGINNING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS       DSQRTF     6
C     DOUBLE PRECISION ARG, DSQRTF                                        DSQRTF     7
C     DSQRTF =  DSQRT(ARG)                                                DSQRTF     8
CIBM  ENDING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS          DSQRTF     9
C                                                                         DSQRTF    10
C                                                                         DSQRTF    11
CCDC  BEGINNING OF STATEMENTS ASSOCIATED WITH CDC COMPUTER PROGRAMS       DSQRTF    12
      DSQRTF =   SQRT(ARG)                                                DSQRTF    13
CCDC  ENDING OF STATEMENTS ASSOCIATED WITH CDC COMPUTER PROGRAMS          DSQRTF    14
C                                                                         DSQRTF    15
      RETURN                                                              DSQRTF    16
      END                                                                 DSQRTF    17
```

```
     SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS      DEF LINE     REFERENCES
    4  DSQRTF          3          15

VARIABLES      SN  TYPE            RELOCATION
    0  ARG         REAL                 F.P.        REFS        12    DEFINED        3
   10  DSQRTF      REAL                          DEFINED        12

EXTERNALS           TYPE   ARGS       REFERENCES
       SQRT        REAL      1 LIBRARY      12

STATISTICS
  PROGRAM LENGTH                 11B        9
         52000B CM USED
```

```
      WRITE (ITAPEW,135)                                                  TAVAM     59
      WRITE (ITAPEW,140)                                                  TAVAM     60
      WRITE (ITAPEW,145)                                                  TAVAM     61
      WRITE (ITAPEW,150)                                                  TAVAM     62
      WRITE (ITAPEW,155)                                                  TAVAM     63
      WRITE (ITAPEW,160)                                                  TAVAM     64
      WRITE (ITAPEW,165)                                                  TAVAM     65
      WRITE (ITAPEW,170)                                                  TAVAM     66
      WRITE (ITAPEW,175)                                                  TAVAM     67
  100 FORMAT (                                                            TAVAM     68
     *     5X,122(1H*)                                                    TAVAM     69
     *,/, 5X,1H*,120X,1H*                                                 TAVAM     70
     *,/, 5X,1H*,15X                                                      TAVAM     71
     A,13H       A                                                        TAVAM     72
     *,52X, 36H.......  ....................  .........,4X,1H*            TAVAM     73
     *,/, 5X,1H*,15X                                                      TAVAM     74
     A,13H      AAA                                                       TAVAM     75
     *,52X, 36H.                                   ..,4X,1H*              TAVAM     76
     *,/, 5X,1H*,15X                                                      TAVAM     77
     A,13H    AAAAA                                                       TAVAM     78
     *,52X, 36H.          **** FASTOP ****         ..,4X,1H*              TAVAM     79
     *,/, 5X,1H*,15X                                                      TAVAM     80
     A,13H    AAAAA                                                       TAVAM     81
     *,52X, 36H.      FLUTTER AND STRUCTURAL       ..,4X,1H*              TAVAM     82
     *,/, 5X,1H*,15X                                                      TAVAM     83
     A,13H   AAA AAA                                                      TAVAM     84
     *,52X, 36H.       OPTIMIZATION PROGRAM         ,4X,1H*)              TAVAM     85
  105 FORMAT (                                                            TAVAM     86
     *     5X,1H*,15X                                                     TAVAM     87
     A,13H   AAA AAA                                                      TAVAM     88
     *,52X, 36H                                    .,4X,1H*               TAVAM     89
     *,/, 5X,1H*,15X                                                      TAVAM     90
     A,13H   AAA AAA                                                      TAVAM     91
     *,52X, 36H.            **** FOP ****           .,4X,1H*              TAVAM     92
     *,/, 5X,1H*,15X                                                      TAVAM     93
     A,13H   AAA AAA                                                      TAVAM     94
     *,52X, 36H.   FLUTTER OPTIMIZATION PACKAGE     ,4X,1H*               TAVAM     95
     *,/, 5X,1H*,15X                                                      TAVAM     96
     A,13H   AAA AAA                                                      TAVAM     97
     *,52X, 36H.                                   ..,4X,1H*              TAVAM     98
     *,/, 5X,1H*,15X                                                      TAVAM     99
     A,13H  AAAAAAAAA                                                     TAVAM    100
     *,52X, 36H.            **** AVAM ****         ..,4X,1H*)             TAVAM    101
  110 FORMAT (                                                            TAVAM    102
     *     5X,1H*,15X                                                     TAVAM    103
     A,13H  AAAAAAAAA                                                     TAVAM    104
     *,13X                                                                TAVAM    105
     V,13HVVV       VVV                                                   TAVAM    106
     *,26X, 36H.            AUTOMATED               ,4X,1H*               TAVAM    107
     *,/, 5X,1H*,15X                                                      TAVAM    108
     A,13H  AAAA AAAA                                                     TAVAM    109
     *,13X                                                                TAVAM    110
     V,13HVVV       VVV                                                   TAVAM    111
     *,26X, 36H.    VIBRATION ANALYSIS MODULE      ..,4X,1H*              TAVAM    112
     *,/, 5X,1H*,15X                                                      TAVAM    113
     A,13H  AAA   AAA                                                     TAVAM    114
     *,13X                                                                TAVAM    115
```

```
      C                                                                   TAVAM      2
      C45700, SUB. TAVAM (TITLE FOR AUTOMATED VIBRATION ANALYSIS MODULE)  TAVAM      3
      C                                                                   TAVAM      4
      C*******************************************************************TAVAM      5
      C                                                                  *TAVAM      6
      C***  SUBROUTINE TAVAM  ********************************************TAVAM      7
      C                                                                  *TAVAM      8
      C***  OBJECTIVE  ***************************************************TAVAM      9
      C     ---------                                                    *TAVAM     10
      C     PRINTS THE TITLE PAGE FOR THE AUTOMATED VIBRATION ANALYSIS   *TAVAM     11
      C     MODULE                                                       *TAVAM     12
            SUBROUTINE TAVAM                                              TAVAM     13
      C                                                                   TAVAM     14
            DIMENSION AFFDL(4)                                            TAVAM     15
      C                                                                   TAVAM     16
            COMMON /COMRWP/ ITAPER,ITAPEW,ITAPEP                          TAVAM     17
            COMMON /CLIST / KOUNT ,KPAGE ,LINES ,LINEST,KLABEL,KTPAGE,NPAGE TAVAM   18
           1               ,KBPAGE,LINESG,KOUNTH,KOUNTI                   TAVAM     19
            COMMON /CTABLE/ KTABLE,NPASS ,NROWS ,NCOLS ,NCOLST,KTABLO,NPAGEA TAVAM  20
           1               ,ITAPET                                        TAVAM     21
            COMMON /CAFFDL/ AFFDL                                         TAVAM     22
      C                                                                   TAVAM     23
      C                                                                   TAVAM     24
      C PREPARE TABLE OF CONTENTS                                         TAVAM     25
      C                                                                   TAVAM     26
            KOUNT  =  LINES                                               TAVAM     27
            CALL TITLES (-1)                                              TAVAM     28
            NCOLS  =  0                                                   TAVAM     29
            NROWS  =  2                                                   TAVAM     30
            KTABLE =  2                                                   TAVAM     31
            CALL PTABLE (1,60,60                                          TAVAM     32
           *   H ***    *   *    ***    *   *                           ) TAVAM     33
            NROWS  =  0                                                   TAVAM     34
            KTABLE =  2                                                   TAVAM     35
            CALL PTABLE (1,60,60                                          TAVAM     36
           *   H*   *   *   *   *   *   ** **           AUTOMATED       ) TAVAM     37
            KTABLE =  2                                                   TAVAM     38
            CALL PTABLE (1,60,60                                          TAVAM     39
           *   H***** -   * *  - ***** - * * *          VIBRATION       ) TAVAM     40
            KTABLE =  2                                                   TAVAM     41
            CALL PTABLE (1,60,60                                          TAVAM     42
           *   H*   *     * *    *    *   * * *          ANALYSIS       ) TAVAM     43
            KTABLE =  2                                                   TAVAM     44
            CALL PTABLE (2,60,60                                          TAVAM     45
           *   H*   *     *      *    *   * * *           MODULE        ) TAVAM     46
            KOUNT  =  LINES                                               TAVAM     47
      C                                                                   TAVAM     48
      C                                                                   TAVAM     49
      C LIST TITLE PAGE                                                   TAVAM     50
      C                                                                   TAVAM     51
            WRITE (ITAPEW,100)                                            TAVAM     52
            WRITE (ITAPEW,105)                                            TAVAM     53
            WRITE (ITAPEW,110)                                            TAVAM     54
            WRITE (ITAPEW,115)                                            TAVAM     55
            WRITE (ITAPEW,120) AFFDL                                      TAVAM     56
            WRITE (ITAPEW,125)                                            TAVAM     57
```

```
COMMON BLOCKS   LENGTH     MEMBERS - BIAS NAME(LENGTH)
                                  69 IFL     (1)              70 IUYT    (1)              71 IFYT    (1)
                                  72 IUZ     (1)              73 IFZ     (1)              74 IUZR    (1)
                                  75 IFZR    (1)              76 IULR    (1)              77 IFLR    (1)
                                  78 IUBR    (1)              79 IFBR    (1)              80 IUPHTF  (1)
                                  81 IFPHTF  (1)              82 IUMODM  (1)              83 IFMODM  (1)
                                  84 IUMODK  (1)              85 IFMODK  (1)              86 IUPHT   (1)
                                  87 IFPHT   (1)              88 IUQT    (1)              89 IFQT    (1)
                                  90 IUQ     (1)              91 IFQ     (1)              92 IUPH    (1)
                                  93 IFPH    (1)              94 IUINCM  (1)              95 IFINCM  (1)
                                  96 IUINCK  (1)              97 IFINCK  (1)
    KLUES          24              0 KLUSE   (1)               1 KLUNAL  (1)               2 IRED    (1)
                                   3 KLUMD   (1)               4 KLUBAL  (1)               5 MSADD   (1)
                                   6 NPAS    (1)               7 IDNOPT  (1)               8 VDES    (1)
                                   9 EPS1    (1)              10 DWMAX   (1)              11 NBAR    (1)
                                  12 NFIX    (1)              13 D       (1)              14 DEL     (1)
                                  15 EPS2    (1)              16 NCYC    (1)              17 NNN     (1)
                                  18 IBAND   (1)              19 IFIN    (1)              20 KLUB    (1)
                                  21 KLUQ    (1)              22 MORBAL  (1)              23 DBAL    (1)
    SIZES           6              0 NSTMEM  (1)               1 NSTDOF  (1)               2 NDYDOF  (1)
                                   3 NNOPT   (1)               4 NDESNO  (1)               5 NDESYS  (1)

STATISTICS
  PROGRAM LENGTH               145B      101
  CM LABELED COMMON LENGTH     333B      219
        52000B CM USED
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```
EXTERNALS          TYPE    ARGS        REFERENCES
        READY                0            189
        TAVAM                0            170
        TIMEB                2            201
        VIBIFO               5            199

STATEMENT LABELS                DEF LINE   REFERENCES
    0  100         INACTIVE       158
    0  150         INACTIVE       165
    0  190         INACTIVE       176
   21  195                        177         178
   34  198                        181         175
    0  210                        187         186
    0  290         INACTIVE       190
    0  400         INACTIVE       200
  121  5060    FMT                205         177

LOOPS  LABEL      INDEX       FROM-TO     LENGTH     PROPERTIES
   41  210        L            186 187        3B      INSTACK

COMMON BLOCKS    LENGTH      MEMBERS - BIAS NAME(LENGTH)
       CFMTA          1                0 FMTA    (1)
       CLUEV         21                0 LKLUEV  (1)          1 KLUEV   (20)
       COMRWP         3                0 ITAPER  (1)          1 ITAPEW  (1)          2 ITAPEP  (1)
       CTSHV          2                0 LTSHV   (1)          1 TSHV    (1)
       CTSH           3                0 KTSH    (1)          1 LTSH    (1)          2 TSH     (1)
       CONSTS         2                0 NO      (1)          1 YES     (1)
       CLIST         11                0 KOUNT   (1)          1 KPAGE   (1)          2 LINES   (1)
                                       3 LINEST  (1)          4 KLABEL  (1)          5 KTPAGE  (1)
                                       6 NPAGE   (1)          7 KBPAGE  (1)          8 LINESG  (1)
                                       9 KOUNTH  (1)         10 KOUNTI  (1)
       CTABLE         8                0 KTABLE  (1)          1 NPASS   (1)          2 NROWS   (1)
                                       3 NCOLS   (1)          4 NCOLST  (1)          5 KTABLO  (1)
                                       6 NPAGEA  (1)          7 ITAPET  (1)
       FREAKS        40                0 FREQ    (40)
       PLACES        98                0 IUIN1   (1)          1 IUIN2   (1)          2 IUOUT1  (1)
                                       3 IUOUT2  (1)          4 IUGO1   (1)          5 IUGO2   (1)
                                       6 IUGO3   (1)          7 IUGO4   (1)          8 IUSCR   (1)
                                       9 IFSCR   (1)         10 IFS1    (1)         11 IFS2    (1)
                                      12 IFS3    (1)         13 IFS4    (1)         14 IUCD    (1)
                                      15 IUPR    (1)         16 IUA     (1)         17 IFA     (1)
                                      18 IUY     (1)         19 IFY     (1)         20 IUMEMN  (1)
                                      21 IFMEMN  (1)         22 IUSTFN  (1)         23 IFSTFN  (1)
                                      24 IUKS    (1)         25 IFKS    (1)         26 IUB     (1)
                                      27 IFB     (1)         28 IUDESO  (1)         29 IFDESO  (1)
                                      30 IUMDBI  (1)         31 IFMDBI  (1)         32 IUADDI  (1)
                                      33 IFADDI  (1)         34 IUBALI  (1)         35 IFBALI  (1)
                                      36 IUDESI  (1)         37 IFDESI  (1)         38 IUWTI   (1)
                                      39 IFWTI   (1)         40 IUMEMO  (1)         41 IFMEMO  (1)
                                      42 IUBT    (1)         43 IFBT    (1)         44 IUDESN  (1)
                                      45 IFDESN  (1)         46 IUMD    (1)         47 IFMD    (1)
                                      48 IUMEMF  (1)         49 IFMEMF  (1)         50 IUSTFO  (1)
                                      51 IFSTFO  (1)         52 IUMDB   (1)         53 IFMDB   (1)
                                      54 IUADD   (1)         55 IFADD   (1)         56 IUBAL   (1)
                                      57 IFBAL   (1)         58 IUDESF  (1)         59 IFDESF  (1)
                                      60 IUWT    (1)         61 IFWT    (1)         62 IUDUM1  (1)
                                      63 IFDUM1  (1)         64 IUDUM2  (1)         65 IFDUM2  (1)
                                      66 IUDUM3  (1)         67 IFDUM3  (1)         68 IUL     (1)
```

```
VARIABLES      SN  TYPE                RELOCATION
     3  KLUMD     INTEGER                   KLUES       REFS        151
     1  KLUNAL    INTEGER                   KLUES       REFS        151
    25  KLUQ      INTEGER                   KLUES       REFS        151
     0  KLUSE     INTEGER                   KLUES       REFS        151      198
   137  KLUZ      INTEGER                               REFS        199    DEFINED     198
   132  KMATV     INTEGER                               REFS        197    DEFINED     184
     0  KOUNT     INTEGER                   CLIST       REFS        129
    11  KOUNTH    INTEGER                   CLIST       REFS        129
    12  KOUNTI    INTEGER                   CLIST       REFS        129
     1  KPAGE     INTEGER                   CLIST       REFS        129
     0  KPLOTV    INTEGER                    F.P.     DEFINED       114      185
     0  KTABLE    INTEGER                   CTABLE      REFS        131
     5  KTABLO    INTEGER                   CTABLE      REFS        131
     5  KTPAGE    INTEGER                   CLIST       REFS        129
     0  KTSH      INTEGER                   CTSH        REFS        127      160
   131  L         INTEGER                               REFS        179     2*187    DEFINED       179       186
     2  LINES     INTEGER                   CLIST       REFS        129
    10  LINESG    INTEGER                   CLIST       REFS        129
     3  LINEST    INTEGER                   CLIST       REFS        129
     0  LKLUEV    INTEGER                   CLUEV       REFS        124      163
     1  LTSH      INTEGER                   CTSH        REFS        127      159        160         186
   124  LTSHR     INTEGER                               REFS        179    DEFINED     159         160
     0  LTSHV     INTEGER                   CTSHV       REFS        126
    26  MORBAL    INTEGER                   KLUES       REFS        151
     5  MSADD     INTEGER                   KLUES       REFS        151
    13  NBAR      INTEGER                   KLUES       REFS        151
   125  NCC       INTEGER                               REFS        180    DEFINED     162
     3  NCOLS     INTEGER                   CTABLE      REFS        131
     4  NCOLST    INTEGER                   CTABLE      REFS        131
    20  NCYC      INTEGER                   KLUES       REFS        151      175        196
   134  NCYCE     INTEGER                               REFS        197      199      DEFINED       196
     4  NDESNO    INTEGER                   SIZES       REFS        154
     5  NDESYS    INTEGER                   SIZES       REFS        154
     2  NDYDOF    INTEGER                   SIZES       REFS        154      192
    14  NFIX      INTEGER                   KLUES       REFS        151
   126  NKLUEV    INTEGER                               REFS        180    DEFINED     163
    21  NNN       INTEGER                   KLUES       REFS        151
     3  NNOPT     INTEGER                   SIZES       REFS        154
     0  NO        INTEGER                   CONSTS      REFS        128
     6  NPAGE     INTEGER                   CLIST       REFS        129
     6  NPAGEA    INTEGER                   CTABLE      REFS        131
     6  NPAS      INTEGER                   KLUES       REFS        151
     1  NPASS     INTEGER                   CTABLE      REFS        131
     2  NROWS     INTEGER                   CTABLE      REFS        131
     1  NSTDOF    INTEGER                   SIZES       REFS        154
     0  NSTMEM    INTEGER                   SIZES       REFS        154
     2  TSH       REAL          ARRAY       CTSH        REFS        121      127      DEFINED       187
     1  TSHV      REAL          ARRAY       CTSHV       REFS        121      126        187       DEFINED      179
   130  VAOOD     REAL                                  REFS        178    DEFINED     177
   105  VAOOR     REAL                                  REFS        178    DEFINED     161
    10  VDES      REAL                      KLUES       REFS        151
     1  YES       INTEGER                   CONSTS      REFS        116      128        160
        VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS              TYPE     ARGS        REFERENCES
        CLUES                    4             180
        EIGEN                    6             197
```

```
VARIABLES      SN  TYPE            RELOCATION
     20  IUA       INTEGER              PLACES       REFS      134
     66  IUADD     INTEGER              PLACES       REFS      134
     40  IUADDI    INTEGER              PLACES       REFS      134
     32  IUB       INTEGER              PLACES       REFS      134
     70  IUBAL     INTEGER              PLACES       REFS      134
     42  IUBALI    INTEGER              PLACES       REFS      134
    116  IUBR      INTEGER              PLACES       REFS      134
     52  IUBT      INTEGER              PLACES       REFS      134
     16  IUCD      INTEGER              PLACES       REFS      134
     72  IUDESF    INTEGER              PLACES       REFS      134
     44  IUDESI    INTEGER              PLACES       REFS      134
     54  IUDESN    INTEGER              PLACES       REFS      134
     34  IUDESO    INTEGER              PLACES       REFS      134
     76  IUDUM1    INTEGER              PLACES       REFS      134
    100  IUDUM2    INTEGER              PLACES       REFS      134
    102  IUDUM3    INTEGER              PLACES       REFS      134
      4  IUGO1     INTEGER              PLACES       REFS      134
      5  IUGO2     INTEGER              PLACES       REFS      134
      6  IUGO3     INTEGER              PLACES       REFS      134
      7  IUGO4     INTEGER              PLACES       REFS      134
    140  IUINCK    INTEGER              PLACES       REFS      134
    136  IUINCM    INTEGER              PLACES       REFS      134
      0  IUIN1     INTEGER              PLACES       REFS      134
      1  IUIN2     INTEGER              PLACES       REFS      134
     30  IUKS      INTEGER              PLACES       REFS      134
    104  IUL       INTEGER              PLACES       REFS      134
    114  IULR      INTEGER              PLACES       REFS      134
     56  IUMD      INTEGER              PLACES       REFS      134
     64  IUMDB     INTEGER              PLACES       REFS      134
     36  IUMDBI    INTEGER              PLACES       REFS      134
     60  IUMEMF    INTEGER              PLACES       REFS      134
     24  IUMEMN    INTEGER              PLACES       REFS      134
     50  IUMEMO    INTEGER              PLACES       REFS      134
    124  IUMODK    INTEGER              PLACES       REFS      134
    122  IUMODM    INTEGER              PLACES       REFS      134
      2  IUOUT1    INTEGER              PLACES       REFS      134
      3  IUOUT2    INTEGER              PLACES       REFS      134
    134  IUPH      INTEGER              PLACES       REFS      134
    126  IUPHT     INTEGER              PLACES       REFS      134
    120  IUPHTF    INTEGER              PLACES       REFS      134
     17  IUPR      INTEGER              PLACES       REFS      134
    132  IUQ       INTEGER              PLACES       REFS      134
    130  IUQT      INTEGER              PLACES       REFS      134
     10  IUSCR     INTEGER              PLACES       REFS      134
     26  IUSTFN    INTEGER              PLACES       REFS      134
     62  IUSTFO    INTEGER              PLACES       REFS      134
     74  IUWT      INTEGER              PLACES       REFS      134
     46  IUWTI     INTEGER              PLACES       REFS      134
     22  IUY       INTEGER              PLACES       REFS      134
    106  IUYT      INTEGER              PLACES       REFS      134
    110  IUZ       INTEGER              PLACES       REFS      134
    112  IUZR      INTEGER              PLACES       REFS      134
      7  KBPAGE    INTEGER              CLIST        REFS      129
      4  KLABEL    INTEGER              CLIST        REFS      129
     24  KLUB      INTEGER              KLUES        REFS      151
      4  KLUBAL    INTEGER              KLUES        REFS      151
```

```
VARIABLES      SN  TYPE            RELOCATION
     7  IDNOPT     INTEGER          KLUES       REFS      151
    21  IFA        INTEGER          PLACES      REFS      134
    67  IFADD      INTEGER          PLACES      REFS      134
    41  IFADDI     INTEGER          PLACES      REFS      134
    33  IFB        INTEGER          PLACES      REFS      134
    71  IFBAL      INTEGER          PLACES      REFS      134
    43  IFBALI     INTEGER          PLACES      REFS      134
   117  IFBR       INTEGER          PLACES      REFS      134
    53  IFBT       INTEGER          PLACES      REFS      134
    73  IFDESF     INTEGER          PLACES      REFS      134
    45  IFDESI     INTEGER          PLACES      REFS      134
    55  IFDESN     INTEGER          PLACES      REFS      134
    35  IFDESO     INTEGER          PLACES      REFS      134
    77  IFDUM1     INTEGER          PLACES      REFS      134
   101  IFDUM2     INTEGER          PLACES      REFS      134
   103  IFDUM3     INTEGER          PLACES      REFS      134
    23  IFIN       INTEGER          KLUES       REFS      151
   141  IFINCK     INTEGER          PLACES      REFS      134
   137  IFINCM     INTEGER          PLACES      REFS      134
    31  IFKS       INTEGER          PLACES      REFS      134
   105  IFL        INTEGER          PLACES      REFS      134
   115  IFLR       INTEGER          PLACES      REFS      134
    57  IFMD       INTEGER          PLACES      REFS      134
    65  IFMDB      INTEGER          PLACES      REFS      134
    37  IFMDBI     INTEGER          PLACES      REFS      134
    61  IFMEMF     INTEGER          PLACES      REFS      134
    25  IFMEMN     INTEGER          PLACES      REFS      134
    51  IFMEMO     INTEGER          PLACES      REFS      134
   125  IFMODK     INTEGER          PLACES      REFS      134
   123  IFMODM     INTEGER          PLACES      REFS      134
   135  IFPH       INTEGER          PLACES      REFS      134
   127  IFPHT      INTEGER          PLACES      REFS      134
   121  IFPHTF     INTEGER          PLACES      REFS      134
   133  IFQ        INTEGER          PLACES      REFS      134
   131  IFQT       INTEGER          PLACES      REFS      134
    11  IFSCR      INTEGER          PLACES      REFS      134
    27  IFSTFN     INTEGER          PLACES      REFS      134
    63  IFSTFO     INTEGER          PLACES      REFS      134
    12  IFS1       INTEGER          PLACES      REFS      134
    13  IFS2       INTEGER          PLACES      REFS      134
    14  IFS3       INTEGER          PLACES      REFS      134
    15  IFS4       INTEGER          PLACES      REFS      134
    75  IFWT       INTEGER          PLACES      REFS      134
    47  IFWTI      INTEGER          PLACES      REFS      134
    23  IFY        INTEGER          PLACES      REFS      134
   107  IFYT       INTEGER          PLACES      REFS      134
   111  IFZ        INTEGER          PLACES      REFS      134
   113  IFZR       INTEGER          PLACES      REFS      134
   136  INDEX1     INTEGER                      REFS      197      199
     2  IRED       INTEGER          KLUES       REFS      151      184
   133  IROW       INTEGER                      REFS      197      199   DEFINED      192
   127  IROWD      INTEGER                      REFS      197   DEFINED      164
   135  ISCR       INTEGER                      REFS      197      199
     2  ITAPEP     INTEGER          COMRWP      REFS      125
     0  ITAPER     INTEGER          COMRWP      REFS      125      180   I/O REFS     176       177       179
     7  ITAPET     INTEGER          CTABLE      REFS      131
     1  ITAPEW     INTEGER          COMRWP      REFS      125
```

```
      C                                                              AVAM   173
      C READ INPUT DATA                                              AVAM   174
      C.... PSN(190) TO PSN(290) ...                                 AVAM   175
            IF(NCYC.GT.0) GO TO 198                                  AVAM   176
        190 REWIND ITAPER                                            AVAM   177
        195 READ (ITAPER,5060) VAOOD                                 AVAM   178
            IF (VAOOD .NE. VAOOR) GO TO 195                          AVAM   179
            READ (ITAPER,FMTA) (TSHV(L), L=1,LTSHR)                  AVAM   180
            CALL CLUES (ITAPER,NCC,NKLUEV,KLUEV)                     AVAM   181
        198 CONTINUE                                                 AVAM   182
      C                                                              AVAM   183
      C                                                              AVAM   184
            KMATV  =   IRED + 1                                      AVAM   185
            KPLOTV=KLUEV(2)                                          AVAM   186
            DO 210 L=1,LTSH                                          AVAM   187
        210 TSH(L) =  TSHV(L)                                        AVAM   188
      C                                                              AVAM   189
            CALL READY                                               AVAM   190
        290 CONTINUE                                                 AVAM   191
      C                                                              AVAM   192
            IROW  =  NDYDOF                                          AVAM   193
      C                                                              AVAM   194
      C SOLVE FOR EIGENVALUES AND EIGENVECTORS                        AVAM   195
      C                                                              AVAM   196
            NCYCE= NCYC                                              AVAM   197
            CALL EIGEN (IROWD,KMATV,ISCR,IROW,NCYCE,INDEX1)          AVAM   198
            KLUZ = KLUSE                                             AVAM   199
            CALL VIBIFO (ISCR,IROW,NCYCE,INDEX1,KLUZ)                AVAM   200
        400 CONTINUE                                                 AVAM   201
            CALL TIMEB (37, 37HFROM AVAM - END OF VIBRATION ANALYSIS)  AVAM   202
      C                                                              AVAM   203
      C                                                              AVAM   204
      C FORMATS                                                      AVAM   205
       5060 FORMAT ( 18A4)                                           AVAM   206
      C                                                              AVAM   207
            RETURN                                                   AVAM   208
            END                                                      AVAM   209
```

SYMBOLIC REFERENCE MAP (R=3)

```
ENTRY POINTS     DEF LINE     REFERENCES
    3  AVAM         114          207

VARIABLES     SN  TYPE           RELOCATION
   15  D          REAL                KLUES        REFS      151
   27  DBAL       REAL                KLUES        REFS      151
   16  DEL        REAL                KLUES        REFS      151
   12  DWMAX      REAL                KLUES        REFS      151
   11  EPS1       REAL                KLUES        REFS      151
   17  EPS2       REAL                KLUES        REFS      151
    0  FMTA       REAL      ARRAY     CFMTA        REFS      118       123       179
    0  FREQ       REAL      ARRAY     FREAKS       REFS      120       133
   22  IBAND      INTEGER             KLUES        REFS      151
```

```
      C                                                                 AVAM     116
            INTEGER YES                                                 AVAM     117
      C                                                                 AVAM     118
            DIMENSION FMTA(1)                                           AVAM     119
            DIMENSION KLUEV(20)                                         AVAM     120
            DIMENSION FREQ(40)                                          AVAM     121
            DIMENSION TSH(1)            ,TSHV(1)                        AVAM     122
      C                                                                 AVAM     123
            COMMON /CFMTA / FMTA                                        AVAM     124
            COMMON /CLUEV / LKLUEV,KLUEV                                AVAM     125
            COMMON /COMRWP/ ITAPER,ITAPEW,ITAPEP                        AVAM     126
            COMMON /CTSHV / LTSHV ,TSHV                                 AVAM     127
            COMMON /CTSH  / KTSH  ,LTSH  ,TSH                           AVAM     128
            COMMON /CONSTS/ NO    ,YES                                  AVAM     129
            COMMON /CLIST / KOUNT ,KPAGE ,LINES ,LINEST,KLABEL,KTPAGE,NPAGE AVAM 130
           1               ,KBPAGE,LINESG,KOUNTH,KOUNTI                 AVAM     131
            COMMON /CTABLE/ KTABLE,NPASS ,NROWS, NCOLS , NCOLST,KTABLO,NPAGEA AVAM 132
           1               ,ITAPET                                      AVAM     133
            COMMON /FREAKS/  FREQ                                       AVAM     134
            COMMON/PLACES/ IUIN1,IUIN2,IUOUT1,IUOUT2,IUGO1,IUGO2,IUGO3,IUGO4, AVAM 135
           1               IUSCR,IFSCR,IFS1,IFS2,IFS3,IFS4,IUCD,IUPR,   AVAM     136
           2               IUA,IFA,IUY,IFY,IUMEMN,IFMEMN,IUSTFN,IFSTFN, AVAM     137
           3               IUKS,IFKS,IUB,IFB,IUDESO,IFDESO,             AVAM     138
           4               IUMDBI,IFMDBI,IUADDI,IFADDI,IUBALI,IFBALI,   AVAM     139
           5               IUDESI,IFDESI,IUWTI,IFWTI,                   AVAM     140
           6               IUMEMO,IFMEMO,IUBT,IFBT,                     AVAM     141
           7               IUDESN,IFDESN,IUMD,IFMD,                     AVAM     142
           8               IUMEMF,IFMEMF,                               AVAM     143
           9               IUSTFO,IFSTFO,IUMDB,IFMDB,IUADD,IFADD,IUBAL,IFBAL, AVAM 144
           A               IUDESF,IFDESF,IUWT,IFWT,                     AVAM     145
           B               IUDUM1,IFDUM1,IUDUM2,IFDUM2,IUDUM3,IFDUM3,   AVAM     146
           C               IUL,IFL,IUYT,IFYT,IUZ,IFZ,IUZR,IFZR,IULR,IFLR, AVAM   147
           D               IUBR,IFBR,                                   AVAM     148
           E               IUPHTF,IFPHTF,IUMODM,IFMODM,                 AVAM     149
           F               IUMODK,IFMODK,IUPHT,IFPHT,IUQT,IFQT,IUQ,IFQ, AVAM     150
           G               IUPH,IFPH,IUINCM,IFINCM,IUINCK,IFINCK        AVAM     151
            COMMON/KLUES/ KLUSE,KLUNAL,IRED,KLUMD,KLUBAL,MSADD,NPAS, IDNOPT, AVAM 152
           1              VDES,EPS1,DWMAX,NBAR,NFIX,D,DEL,EPS2,NCYC,NNN,IBAND, AVAM 153
           2              IFIN,KLUB,KLUQ,MORBAL,DBAL                    AVAM     154
            COMMON /SIZES / NSTMEM,NSTDOF,NDYDOF,NNOPT,NDESNO,NDESYS    AVAM     155
      C                                                                 AVAM     156
      C INITIAL CONDITIONS                                              AVAM     157
      C...  PSN(100) TO PSN(150) ....                                   AVAM     158
        100 CONTINUE                                                    AVAM     159
            LTSHR  =  LTSH                                              AVAM     160
            IF (KTSH .EQ. YES) LTSHR = LTSH-2                           AVAM     161
            DATA VAOOR  /4HVAOO/                                        AVAM     162
            NCC     =  10                                               AVAM     163
            NKLUEV=LKLUEV                                               AVAM     164
            IROWD = 220                                                 AVAM     165
        150 CONTINUE                                                    AVAM     166
      C                                                                 AVAM     167
      C                                                                 AVAM     168
      C PRINT TITLE FOR AUTOMATED VIBRATION ANALYSIS MODULE              AVAM     169
      C                                                                 AVAM     170
            CALL TAVAM                                                  AVAM     171
      C                                                                 AVAM     172
```

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C     KLUEV( 4) = 0. DO NOT LIST DYNAMIC MASS MATRIX                     AVAM      59
C                = 4. LIST DYNAMIC MASS MATRIX                           AVAM      60
C     KLUEV( 5) = 0. DO NOT LIST INTERMEDIATE RESULTS USED IN            AVAM      61
C                     COMPUTATION OF DYNAMIC MASS MATRIX(E.G  INCREMENTAL AVAM     62
C                     MASS MATRIX IN STRUCTURAL AND DYNAMICS GRIDS)      AVAM      63
C     KLUEV( 5) = 5. LIST INTERMEDIATE MASS RESULTS                      AVAM      64
C     KLUEV( 6) = 0. DO NOT LIST TRANSFORMATION MATRIX BETWEEN DYNAMIC   AVAM      65
C                     AND STRUCTURAL COORDINATES                         AVAM      66
C     KLUEV( 6) = 6  LIST TRANSFORMATION MATRIX BETWEEN DYNAMIC AND      AVAM      67
C                     STRUCTURAL COORDINATES                             AVAM      68
C                                                                      * AVAM      69
C     THE VALUES OF THE CARD INPUT DATA CONTROL WORD OPTIONS (KLUEV(I))* AVAM      70
C     GIVEN ABOVE ARE ENTERED INTO THE PROGRAM BY THE SUBROUTINE CLUES * AVAM      71
C     AND THEN CHANGED, WITHIN THE SUBROUTINE CLUES, TO A NEW SET OF   * AVAM      72
C     NUMERICAL VALUES.                                                * AVAM      73
C     A VALUE OF ONE (CORRESPONDING TO THE ORIGINAL ZERO VALUE)        * AVAM      74
C     INDICATES THAT THE OPTION IS TO BE DELETED WHEREAS A VALUE OF TWO* AVAM      75
C     (CORRESPONDING TO THE ORIGINAL I'TH VALUE) INDICATES THAT THE    * AVAM      76
C     OPTION IS TO BE EXERCISED.                                       * AVAM      77
C     FINALLY, FOR PROGRAMMING CONVENIENCE, A NEW SET OF OPTIONS       * AVAM      78
C     REFERRED TO AS PROGRAM CONTROL WORD OPTIONS (KXXXXX) ARE DEFINED * AVAM      79
C     TO BE EQUIVALENT TO THE CARD INPUT CONTROL WORD OPTIONS.         * AVAM      80
C                                                                      * AVAM      81
C     KLUEV(I) = 0, IS CHANGED TO 1, AND CORRESPONDS TO  KXXXXX = 1    * AVAM      82
C     KLUEV(I) = I, IS CHANGED TO 2, AND CORRESPONDS TO  KXXXXX = 2    * AVAM      83
C                                                                      * AVAM      84
C     THE SPECIFIC RELATIONSHIP OF THE CARD INPUT DATA AND PROGRAM     * AVAM      85
C     CONTROL WORD OPTIONS IS GIVEN BELOW.                             * AVAM      86
C                                                                      * AVAM      87
C     KLUEV( 1) = NOT USED                                               AVAM      88
C     KLUEV( 2) = KPLOTV                                                 AVAM      89
C     KLUEV( 3) = KLISTV                                                 AVAM      90
C     KLUEV( 4) = IOMD                                                   AVAM      91
C     KLUEV( 5) = IOMALL                                                 AVAM      92
C     KLUEV( 6) = IOB                                                    AVAM      93
C                                                                      * AVAM      94
C.... KLUEV(I) ..... INTERMEDIATE, (I = LKLUEV+1,...,2*LKLUEV)         * AVAM      95
C     PROGRAM CONTROL WORD OPTION FOR INDICATING WHICH OF THE OPTIONS  * AVAM      96
C     IN VIBRATION ANALYSIS HAVE BEEN PERFORMED.                       * AVAM      97
C                                                                      * AVAM      98
C     VALUES DEFINED WITHIN THE PROGRAM HAVE THE FOLLOWING GENERAL     * AVAM      99
C     FUNCTION ...                                                     * AVAM     100
C     KLUEV(I) = 0, THE I'TH VIBRATION ANALYSIS OPTION HAS NOT         * AVAM     101
C                   BEEN PERFORMED IN THE CURRENT RUN.                 * AVAM     102
C              = I, THE I'TH VIBRATION ANALYSIS OPTION HAS BEEN        * AVAM     103
C                   PERFORMED IN THE CURRENT RUN.                      * AVAM     104
C     WHERE THE SPECIFIC FUNCTION OF EACH VARIABLE IS ASSOCIATED WITH  * AVAM     105
C     THE SPECIFIC FUNCTION OF THE VARIABLE KLUEV(I) FOR               * AVAM     106
C     I = 1,...,LKLUEV.                                                * AVAM     107
C                                                                      * AVAM     108
C***  ERROR MESSAGES  ************************************************** AVAM     109
C     --------------                                                   * AVAM     110
C     NONE.                                                              AVAM     111
C                                                                      * AVAM     112
C********************************************************************** AVAM     113
C                                                                        AVAM     114
      SUBROUTINE AVAM (KPLOTV)                                           AVAM     115
```

```
C                                                                      AVAM     2
C45700. SUB  AVAM (AUTOMATED VIBRATION ANALYSIS MODULE)                 AVAM     3
C                                                                      AVAM     4
C                                                                    * AVAM     5
C******************************************************************** AVAM     6
C******************************************************************** AVAM     7
C******************************************************************** AVAM     8
C******************************************************************** AVAM     9
C******************************************************************** AVAM    10
C*****                                                         ****** AVAM    11
C*****               AAA    V   V    AAA     M   M             ****** AVAM    12
C*****              A   A   V   V   A   A   MM MM              ****** AVAM    13
C*****              AAAAA -  V V  - AAAAA - M M M              ****** AVAM    14
C*****              A   A    V V    A   A   M M M              ****** AVAM    15
C*****              A   A     V     A   A   M M M              ****** AVAM    16
C*****                                                         ****** AVAM    17
C******************************************************************** AVAM    18
C******************************************************************** AVAM    19
C******************************************************************** AVAM    20
C******************************************************************** AVAM    21
C******************************************************************** AVAM    22
C                                                                    * AVAM    23
C******************************************************************** AVAM    24
C                                                                    * AVAM    25
C***  SUBROUTINE AVAM ************************************************ AVAM    26
C                                                                    * AVAM    27
C***  COMPUTER VERSION                                               * AVAM    28
C     ----------------                                               * AVAM    29
C     IBM  ... AS IS.                                                * AVAM    30
C                                                                    * AVAM    31
C     CDC .... AS IS.                                                * AVAM    32
C                                                                    * AVAM    33
C***  OBJECTIVE ****************************************************** AVAM    34
C     ---------                                                      * AVAM    35
C     MAJOR PROGRAM, WHICH CALLS OTHER PROGRAMS, FOR PERFORMING      * AVAM    36
C     VIBRATION ANALYSIS, THAT IS, CALCULATING THE FREQUENCIES,      * AVAM    37
C     MODE SHAPES, AND GENERALIZED MASSES FOR FLUTTER ANALYSIS       * AVAM    38
C                                                                    * AVAM    39
C***  INPUT/OUTPUT *************************************************** AVAM    40
C     ------------                                                   * AVAM    41
C                                                                    * AVAM    42
C***  SUMMARY OF SYMBOLS ********************************************* AVAM    43
C     ------------------                                             * AVAM    44
C...  KLUEV(I) .... INPUT, (I = 1, ...,LKLUEV)                       * AVAM    45
C     INPUT DATA CONTROL WORD OPTIONS TO OBTAIN VIBRATION INFORMATION * AVAM    46
C                                                                    * AVAM    47
C     VALUES ENTERED AS DATA HAVE THE FOLLOWING GENERAL FUNCTION ... * AVAM    48
C     KLUEV( I) = 0, DO NOT PERFORM THE I'TH OPTION OF VIBRATION     * AVAM    49
C                    ANALYSIS                                        * AVAM    50
C               = I, PERFORM THE I'TH OPTION OF VIBRATION ANALYSIS.  * AVAM    51
C                                                                    * AVAM    52
C     WHERE THE SPECIFIC FUNCTION OF EACH VARIABLE IS.               * AVAM    53
C     KLUEV( 1) =  , DUMMY VARIABLE                                    AVAM    54
C     KLUEV( 2) = 0, DO NOT PLOT VIBRATION MODES ON CALCOMP            AVAM    55
C               = 2, PLOT VIBRATION MODES ON CALCOMP                   AVAM    56
C     KLUEV( 3) = 0, DO NOT LIST FLEXIBILITY (OR STIFFNESS) MATRIX     AVAM    57
C               = 3, LIST FLEXIBILITY (OR STIFFNESS) MATRIX            AVAM    58
```

```
C45700. FUN  RDM (RANDOM FUNCTION)                                     RDM     2
C                                                                      RDM     3
      FUNCTION RDM (ARG)                                               RDM     4
C                                                                      RDM     5
CIBM  BEGINNING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS    RDM     6
C     DATA IY /5757403/                                                RDM     7
C     IY      =  IY*65539                                              RDM     8
C     IF (IY .GE. O) GO TO 6                                           RDM     9
C     IY      =  IY + 2147483647 + 1                                   RDM    10
C   6 YFL     =  IY                                                    RDM    11
C     RDM     =  YFL*O.4656613E-09                                     RDM    12
CIBM  ENDING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS       RDM    13
C                                                                      RDM    14
C                                                                      RDM    15
CCDC  BEGINNING OF STATEMENTS ASSOCIATED WITH CDC COMPUTER PROGRAMS    RDM    16
      RDM     =  RANF (ARG)                                            RDM    17
CCDC  ENDING OF STATEMENTS ASSOCIATED WITH CDC COMPUTER PROGRAMS       RDM    18
C                                                                      RDM    19
      RETURN                                                           RDM    20
      END                                                              RDM    21
```

```
    SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS      DEF LINE     REFERENCES
    4  RDM            3          19

VARIABLES      SN  TYPE            RELOCATION
    O  ARG          REAL                F.P.        REFS        16   DEFINED        3
   11  RDM          REAL                         DEFINED        16

INLINE FUNCTIONS    TYP     ARGS         DEF LINE  REFERENCES
       RANF         REAL       1  INTRIN                16

STATISTICS
  PROGRAM LENGTH                   12B        10
        52000B CM USED
```

```
C45700. FUN. CDABSF (ABSOLUTE VALUE)                                  CDABSF     2
C                                                                     CDABSF     3
      FUNCTION CDABSF(ARG)                                            CDABSF     4
C                                                                     CDABSF     5
CIBM  BEGINNING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS   CDABSF     6
C     COMPLEX*16 ARG                                                  CDABSF     7
C     DOUBLE PRECISION CDABSF                                         CDABSF     8
C     CDABSF =  CDABS(ARG)                                            CDABSF     9
CIBM  ENDING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS      CDABSF    10
C                                                                     CDABSF    11
C                                                                     CDABSF    12
CCDC  BEGINNING OF STATEMENTS ASSOCIATED WITH CDC COMPUTER PROGRAMS   CDABSF    13
      COMPLEX ARG                                                     CDABSF    14
      CDABSF =   CABS(ARG)                                            CDABSF    15
CCDC  ENDING OF STATEMENTS ASSOCIATED WITH CDC COMPUTER PROGRAMS      CDABSF    16
C                                                                     CDABSF    17
      RETURN                                                          CDABSF    18
      END                                                             CDABSF    19
```

```
   SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS     DEF LINE     REFERENCES
   4  CDABSF         3           17

VARIABLES      SN  TYPE           RELOCATION
   O  ARG          COMPLEX           F.P.      REFS        13       14    DEFINED       3
  11  CDABSF       REAL                        DEFINED     14

EXTERNALS          TYPE    ARGS        REFERENCES
      CABS         REAL       1 LIBRARY     14

STATISTICS
  PROGRAM LENGTH                   12B        10
        52000B CM USED
```

```
      C45700. FUN. DCMPLF (COMPLEX FUNCTION)                                  DCMPLF     2
      C                                                                       DCMPLF     3
      CIBM  BEGINNING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS     DCMPLF     4
      C     COMPLEX FUNCTION DCMPLF*16 (ARG1,ARG2)                            DCMPLF     5
      C     DOUBLE PRECISION ARG1, ARG2                                       DCMPLF     6
      C     DCMPLF =  DCMPLX (ARG1,ARG2)                                      DCMPLF     7
      CIBM  ENDING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS        DCMPLF     8
      C                                                                       DCMPLF     9
      C                                                                       DCMPLF    10
      CCDC  BEGINNING OF STATEMENTS ASSOCIATED WITH CDC COMPUTER PROGRAMS     DCMPLF    11
            COMPLEX FUNCTION DCMPLF (ARG1,ARG2)                               DCMPLF    12
            DCMPLF =  CMPLX (ARG1,ARG2)                                       DCMPLF    13
      CCDC  ENDING OF STATEMENTS ASSOCIATED WITH CDC COMPUTER PROGRAMS        DCMPLF    14
      C                                                                       DCMPLF    15
            RETURN                                                            DCMPLF    16
            END                                                               DCMPLF    17
```

```
    SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS      DEF LINE      REFERENCES
    5  DCMPLF         11           15

VARIABLES      SN  TYPE            RELOCATION
    O  ARG1        REAL                F.P.        REFS        12    DEFINED       11
    O  ARG2        REAL                F.P.        REFS        12    DEFINED       11
   13  DCMPLF      COMPLEX                       DEFINED       12

INLINE FUNCTIONS    TYPE    ARGS        DEF LINE  REFERENCES
       CMPLX        COMPLEX    2  INTRIN                12

STATISTICS
  PROGRAM LENGTH                  15B       13
          52000B CM USED
```

```
            V,13HVVV       VVV                                              TAVAM     116
           *,26X, 36H.                                     .,4X,1H*)        TAVAM     117
       115 FORMAT (                                                         TAVAM     118
           *     5X,1H*,15X                                                 TAVAM     119
           A,13H  AAA    AAA                                                TAVAM     120
           *,13X                                                            TAVAM     121
           V,13H VVV     VVV                                                TAVAM     122
           *,26X, 36H. ....................................,4X,1H*          TAVAM     123
           *,/, 5X,1H*,15X                                                  TAVAM     124
           A,13H AAA     AAA                                                TAVAM     125
           *,13X                                                            TAVAM     126
           V,13H VVV     VVV                                                TAVAM     127
           *,26X, 36H.                                     .,4X,1H*         TAVAM     128
           *,/, 5X,1H*,15X                                                  TAVAM     129
           A,13H AAA     AAA                                                TAVAM     130
           *,13X                                                            TAVAM     131
           V,13H VVV     VVV                                                TAVAM     132
           *,26X, 36H            AIR FORCE                 .,4X,1H*)        TAVAM     133
       120 FORMAT (                                                         TAVAM     134
           *     5X,1H*,15X                                                 TAVAM     135
           A.13H AAA     AAA                                                TAVAM     136
           *,13X                                                            TAVAM     137
           V,13H  VVV   VVV                                                 TAVAM     138
           *,26X, 36H.    FLIGHT DYNAMICS LABORATORY     .,4X,1H*           TAVAM     139
           *,/, 5X,1H*,15X                                                  TAVAM     140
           A,13HAAA        AAA                                              TAVAM     141
           *,13X                                                            TAVAM     142
           V,13H  VVV   VVV                                                 TAVAM     143
           *.26X, 36H.                                     .,4X,1H*         TAVAM     144
           *./, 5X,1H*,15X                                                  TAVAM     145
           A,13HAAA        AAA                                              TAVAM     146
           *.13X                                                            TAVAM     147
           V,13H  VVV   VVV                                                 TAVAM     148
           *,26X, 10H.          ,4A4, 10H          .,4X,1H*)                TAVAM     149
       125 FORMAT (                                                         TAVAM     150
           *     5X,1H*,15X                                                 TAVAM     151
           A,13HAAA        AAA                                              TAVAM     152
           *,13X                                                            TAVAM     153
           V,13H  VVV   VVV                                                 TAVAM     154
           *,26X, 36H.                                     .,4X,1H*         TAVAM     155
           *,/, 5X,1H*,41X                                                  TAVAM     156
           V,13H  VVV   VVV                                                 TAVAM     157
           *,13X                                                            TAVAM     158
           A,13H      A                                                     TAVAM     159
           *,     36H.....................................,4X,1H*          TAVAM     160
           *,/, 5X,1H*,41X                                                  TAVAM     161
           V,13H   VVV VVV                                                  TAVAM     162
           *,13X                                                            TAVAM     163
           A,13H     AAA                                                    TAVAM     164
           *,40X,1H*)                                                       TAVAM     165
       130 FORMAT (                                                         TAVAM     166
           *     5X,1H*,41X                                                 TAVAM     167
           V,13H   VVV VVV                                                  TAVAM     168
           *.13X                                                            TAVAM     169
           A.13H    AAAAA                                                   TAVAM     170
           *.40X,1H*                                                        TAVAM     171
           *,/, 5X,1H*,41X                                                  TAVAM     172
```

```
      V,13H   VVV VVV                                              TAVAM    173
     *,13X                                                         TAVAM    174
      A,13H    AAAAA                                               TAVAM    175
     *,40X, 1H*                                                    TAVAM    176
     *,/, 5X,1H*,41X                                               TAVAM    177
      V,13H   VVV VVV                                              TAVAM    178
     *,13X                                                         TAVAM    179
      A,13H   AAA AAA                                              TAVAM    180
     *,40X,1H*)                                                    TAVAM    181
  135 FORMAT (                                                     TAVAM    182
     *     5X,1H*,41X                                              TAVAM    183
      V,13H   VVV VVV                                              TAVAM    184
     *,13X                                                         TAVAM    185
      A,13H   AAA AAA                                              TAVAM    186
     *,40X,1H*                                                     TAVAM    187
     *,/, 5X,1H*,41X                                               TAVAM    188
      V,13H    VVVVV                                               TAVAM    189
     *,13X                                                         TAVAM    190
      A,13H   AAA AAA                                              TAVAM    191
     *,40X,1H*                                                     TAVAM    192
     *,/, 5X,1H*,41X                                               TAVAM    193
      V,13H    VVVVV                                               TAVAM    194
     *,13X                                                         TAVAM    195
      A,13H   AAA AAA                                              TAVAM    196
     *,40X,1H*)                                                    TAVAM    197
  140 FORMAT (                                                     TAVAM    198
     *     5X,1H*,41X                                              TAVAM    199
      V,13H      VVV                                               TAVAM    200
     *,13X                                                         TAVAM    201
      A,13H   AAA AAA                                              TAVAM    202
     *,40X,1H*                                                     TAVAM    203
     *,/, 5X,1H*,41X                                               TAVAM    204
      V,13H       V                                                TAVAM    205
     *,13X                                                         TAVAM    206
      A,13H  AAAAAAAAA                                             TAVAM    207
     *,40X,1H*                                                     TAVAM    208
     *,/, 5X,1H*,67X                                               TAVAM    209
      A,13H  AAAAAAAAA                                             TAVAM    210
     *,13X                                                         TAVAM    211
      M,13HMMM        MMM                                          TAVAM    212
     *,14X,1H*)                                                    TAVAM    213
  145 FORMAT (                                                     TAVAM    214
     *     5X,1H*,2X                                               TAVAM    215
     *,65X                                                         TAVAM    216
      A,13H  AAAA AAAA                                             TAVAM    217
     *,13X                                                         TAVAM    218
      M,13HMMM        MMM                                          TAVAM    219
     *,14X,1H*                                                     TAVAM    220
     *,/, 5X,1H*,2X                                                TAVAM    221
     *,65X                                                         TAVAM    222
      A,13H  AAA    AAA                                            TAVAM    223
     *,13X                                                         TAVAM    224
      M,13HMMMM      MMMM                                          TAVAM    225
     *,14X,1H*                                                     TAVAM    226
     *,/, 5X,1H*,2X                                                TAVAM    227
     *,65X                                                         TAVAM    228
```

```
     *,13X                                                               TAVAM     230
     M,13HMMMMM     MMMM                                                 TAVAM     231
     *,14X, 1H*)                                                         TAVAM     232
 150 FORMAT (                                                            TAVAM     233
     *     5X,1H*,2X                                                     TAVAM     234
     *,65X                                                               TAVAM     235
     A,13H AAA      AAA                                                  TAVAM     236
     *,13X                                                               TAVAM     237
     M,13HMMMMMM   MMMMM                                                 TAVAM     238
     *,14X,1H*                                                           TAVAM     239
     *,/, 5X,1H*,2X                                                      TAVAM     240
     *,65X                                                               TAVAM     241
     A,13H AAA      AAA                                                  TAVAM     242
     *,13X                                                               TAVAM     243
     M,13HMMMMMM   MMMMM                                                 TAVAM     244
     *,14X,1H*                                                           TAVAM     245
     *,/, 5X,1H*,2X                                                      TAVAM     246
     *,8(3HGGG), 40HGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGG,1X          TAVAM     247
     A,13H AAA      AAA                                                  TAVAM     248
     *,13X                                                               TAVAM     249
     M,13HMMMMMM   MMMMM                                                 TAVAM     250
     *,14X,1H*)                                                          TAVAM     251
 155 FORMAT (                                                            TAVAM     252
     *     5X,1H*,2X                                                     TAVAM     253
     *,8(3HGGG), 40HGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGG      ,1X          TAVAM     254
     A,13HAAA        AAA                                                 TAVAM     255
     *,13X                                                               TAVAM     256
     M,13HMMMMMMM MMMMMM                                                 TAVAM     257
     *,14X,1H*                                                           TAVAM     258
     *,/, 5X,1H*,2X                                                      TAVAM     259
     *,24X,        40H  GGGGGGGGGGGGGGGGGGGGGGGGGGGGG            ,1X      TAVAM     260
     A,13HAAA        AAA                                                 TAVAM     261
     *,13X                                                               TAVAM     262
     M,13HMMMM MM MM MMM                                                 TAVAM     263
     *,14X,1H*                                                           TAVAM     264
     *,/, 5X,1H*,2X                                                      TAVAM     265
     *,24X,        40H   GGGGGGGGGGGGGGGGGGGGGG                  ,1X      TAVAM     266
     A,13HAAA        AAA                                                 TAVAM     267
     *,13X                                                               TAVAM     268
     M,13HMMMM MM MM MMM                                                 TAVAM     269
     *,14X,1H*)                                                          TAVAM     270
 160 FORMAT (                                                            TAVAM     271
     *     5X,1H*,2X                                                     TAVAM     272
     *,5X,   15H...............,4X                                       TAVAM     273
     *,            40H    GGGGGGGGGGGGGGGG                       ,1X      TAVAM     274
     *,26X                                                               TAVAM     275
     M,13HMMMM MMMMM MMM                                                 TAVAM     276
     *,14X,1H*                                                           TAVAM     277
     *,/, 5X,1H*,2X                                                      TAVAM     278
     *,5X,   15H.              .,4X                                      TAVAM     279
     *,            40H   GGGGGGGGGGGGGGG                         ,1X      TAVAM     280
     *,26X                                                               TAVAM     281
     M,13HMMMM MMMMM MMM                                                 TAVAM     282
     *,14X,1H*                                                           TAVAM     283
     *,/, 5X,1H*,2X                                                      TAVAM     284
     *,5X,   15H.   GRUMMAN    .,4X                                      TAVAM     285
     *,            40H  GGGGGGGGGGGGGG                           ,1X      TAVAM     286
```

```
           *,26X                                                      TAVAM     287
           M,13HMMM  MMM  MMM                                         TAVAM     288
           *,14X,1H*)                                                 TAVAM     289
       165 FORMAT (                                                   TAVAM     290
           *    5X,1H*,2X                                             TAVAM     291
           *,5X,  15H.  AEROSPACE  .,4X                               TAVAM     292
           *,          40H  GGGGGGGGGGGG                    ,1X       TAVAM     293
           *,26X                                                      TAVAM     294
           M,13HMMM  MMM  MMM                                         TAVAM     295
           *,14X,1H*                                                  TAVAM     296
           *,/, 5X,1H*,2X                                             TAVAM     297
           *,5X,  15H. CORPORATION  ,4X                               TAVAM     298
           *,          40H  GGGGGGGGGG                      ,1X       TAVAM     299
           *,26X                                                      TAVAM     300
           M,13HMMM  MMM  MMM                                         TAVAM     301
           *,14X,1H*                                                  TAVAM     302
           *,/, 5X,1H*,2X                                             TAVAM     303
           *,5X,  15H.              .,4X                              TAVAM     304
           *,          40H  GGGGGGGG                        ,1X       TAVAM     305
           *,26X                                                      TAVAM     306
           M,13HMMM  MMM  MMM                                         TAVAM     307
           *,14X,1H*)                                                 TAVAM     308
       170 FORMAT (  5X, 1H*, 2X                                      TAVAM     309
           *,5X,  15H...............,4X                               TAVAM     310
           *,          40H  GGGGGG                          ,1X       TAVAM     311
           *,26X                                                      TAVAM     312
           M,13HMMM  MMM  MMM                                         TAVAM     313
           *,14X,1H*                                                  TAVAM     314
           *,/, 5X,1H*,2X                                             TAVAM     315
           *,24X,      40H  GGGG                            ,1X       TAVAM     316
           *,26X                                                      TAVAM     317
           M,13HMMM  MMM  MMM                                         TAVAM     318
           *,14X,1H*                                                  TAVAM     319
           *,/, 5X,1H*,2X                                             TAVAM     320
           *,24X,      40H  GG                              ,1X       TAVAM     321
           *,26X                                                      TAVAM     322
           M,13HMMM  MMM  MMM                                         TAVAM     323
           *,14X,1H*                                                  TAVAM     324
           *,/, 5X,1H*,2X                                             TAVAM     325
           *,24X,      40H  G                               ,1X       TAVAM     326
           *,26X                                                      TAVAM     327
           M,13HMMM  MMM  MMM      ,14X,1H*)                          TAVAM     328
       175 FORMAT ( 5X,1H*,120X,1H*,/,5X,122(1H*))                    TAVAM     329
     C                                                                TAVAM     330
            RETURN                                                    TAVAM     331
            END                                                       TAVAM     332
```

SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS	DEF LINE	REFERENCES
1 TAVAM	12	330

```
VARIABLES      SN  TYPE           RELOCATION
    0  AFFDL     REAL      ARRAY    CAFFDL      REFS        14       21        55
    2  ITAPEP    INTEGER            COMRWP      REFS        16
    0  ITAPER    INTEGER            COMRWP      REFS        16
    7  ITAPET    INTEGER            CTABLE      REFS        19
    1  ITAPEW    INTEGER            COMRWP      REFS        16   I/O REFS      51        52        53        54        55
                                                   56       57       58        59        60        61        62        63
                                                   64       65       66
    7  KBPAGE    INTEGER            CLIST       REFS        17
    4  KLABEL    INTEGER            CLIST       REFS        17
    0  KOUNT     INTEGER            CLIST       REFS        17   DEFINED       26        46
   11  KOUNTH    INTEGER            CLIST       REFS        17
   12  KOUNTI    INTEGER            CLIST       REFS        17
    1  KPAGE     INTEGER            CLIST       REFS        17
    0  KTABLE    INTEGER            CTABLE      REFS        19   DEFINED       30        34        37        40        43
    5  KTABLO    INTEGER            CTABLE      REFS        19
    5  KTPAGE    INTEGER            CLIST       REFS        17
    2  LINES     INTEGER            CLIST       REFS        17       26        46
   10  LINESG    INTEGER            CLIST       REFS        17
    3  LINEST    INTEGER            CLIST       REFS        17
    3  NCOLS     INTEGER            CTABLE      REFS        19   DEFINED       28
    4  NCOLST    INTEGER            CTABLE      REFS        19
    6  NPAGE     INTEGER            CLIST       REFS        17
    6  NPAGEA    INTEGER            CTABLE      REFS        19
    1  NPASS     INTEGER            CTABLE      REFS        19
    2  NROWS     INTEGER            CTABLE      REFS        19   DEFINED       29        33
       VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS          TYPE    ARGS         REFERENCES
       PTABLE                3               31       35        38       41        44
       TITLES                1               27

STATEMENT LABELS              DEF LINE    REFERENCES
  201   100     FMT               67          51
  251   105     FMT               85          52
  317   110     FMT              101          53
  354   115     FMT              117          54
  411   120     FMT              133          55
  445   125     FMT              149          56
  475   130     FMT              165          57
  516   135     FMT              181          58
  537   140     FMT              197          59
  560   145     FMT              213          60
  601   150     FMT              232          61
  627   155     FMT              251          62
  666   160     FMT              270          63
  726   165     FMT              289          64
  766   170     FMT              308          65
 1032   175     FMT              328          66

COMMON BLOCKS    LENGTH     MEMBERS - BIAS NAME(LENGTH)
       COMRWP        3               0 ITAPER (1)              1 ITAPEW (1)              2 ITAPEP (1)
       CLIST        11               0 KOUNT  (1)              1 KPAGE  (1)              2 LINES  (1)
                                     3 LINEST (1)              4 KLABEL (1)              5 KTPAGE (1)
                                     6 NPAGE  (1)              7 KBPAGE (1)              8 LINESG (1)
                                     9 KOUNTH (1)             10 KOUNTI (1)
       CTABLE        8               0 KTABLE (1)              1 NPASS  (1)              2 NROWS  (1)
```

```
COMMON BLOCKS   LENGTH     MEMBERS - BIAS NAME(LENGTH)
                                     3 NCOLS  (1)                4 NCOLST (1)                5 KTABLO (1)
                                     6 NPAGEA (1)                7 ITAPET (1)
       CAFFDL        4               0 AFFDL  (4)

STATISTICS
  PROGRAM LENGTH              1104B      580
  CM LABELED COMMON LENGTH      32B       26
          52000B CM USED
```

```
      SUBROUTINE READY                                                  READY    2
C                                                                       READY    3
C                                                                       READY    4
C                                                                       READY    5
CIBM  BEGINNING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS     READY    6
C     DOUBLE PRECISION ELSTF                                            READY    7
C     DOUBLE PRECISION BUFFD(220)                                       READY    8
CIBM  ENDING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS        READY    9
C                                                                       READY   10
C                                                                       READY   11
      DIMENSION WORK(28000),BUFFER(310)                                 READY   12
      DIMENSION MUMJ(4),IDJ(4),FACTJ(4),JCHART(4,1),CHART(4,1)          READY   13
      DIMENSION NUMB(10),VALUE(10)                                      READY   14
      DIMENSION ROE(15)                                                 READY   15
      DIMENSION NAME(2),NAM1(2),NAM2(2),NAM3(2),NAM4(2)                 READY   16
      DIMENSION IPOS(20)                                                READY   17
      DIMENSION J1(3),MB(1)                                             READY   18
      DIMENSION MSTOR(1),KSTOR(1),F(3),G(3)                             READY   19
      DIMENSION B(3),C(3),IJS(6),IJD(6)                                 READY   20
      DIMENSION S(6), T(6)                                              READY   21
      DIMENSION NAMFLX(2)                                               READY   22
      DIMENSION DMAPNM(2)                                               READY   23
C                                                                       READY   24
      EQUIVALENCE (WORK(1),IWORK,JCHART(1,1),CHART(1,1)),               READY   25
     *            (BUFFER(1),IBUF),(ROE(1),IROE),(MB(1),NMBAL)          READY   26
C                                                                       READY   27
C  ****************************************************                 READY   28
C  *      THE FOLLOWING LINE OF FASTOP CODE HAS       *                 READY   29
C  *      BEEN COMMENTED OUT BECAUSE IT IS NOT        *                 READY   30
C  *      USED IN THE CURRENT VERSION OF ESP.         *                 READY   31
C  ****************************************************                 READY   32
C     EQUIVALENCE (PATTY(1),MEM),(PATTY(2),NODES),(PATTY(3),IROW),      READY   33
C    *            (PATTY(4),ICOL),(PATTY(5),WT),(PATTY(6),MEMTYP)       READY   34
C                                                                       READY   35
      EQUIVALENCE (MSTOR(1),NUMSTR) , (KSTOR(1),ICYCLE)                 READY   36
C                                                                       READY   37
      COMMON/BAL/ NMBAL,IDBAL(20),VMBIN(20),VMBOLD(20),VMBNEW(20),      READY   38
     1            MBDOF(20,3),DRVMB(20),DRVMBO(20),                     READY   39
     2            S1MB(20),S2MB(20),S3MB(20)                            READY   40
C                                                                       READY   41
C  ****************************************************                 READY   42
C  *      THE FOLLOWING LINE OF FASTOP CODE HAS       *                 READY   43
C  *      BEEN COMMENTED OUT BECAUSE IT IS NOT        *                 READY   44
C  *      USED IN THE CURRENT VERSION OF ESP.         *                 READY   45
C  ****************************************************                 READY.  46
C     COMMON /ELMNT/ ELSTF(24,24),PATTY(6),NSTART(8),NGO(8)             READY   47
C                                                                       READY   48
      COMMON/COLS/ IT,IMINT,IMAXT,IDENS,IOLDT,IOLDW,ISRAT,IMINTO,       READY   49
     A             IINITT,IWPUT,                                        READY   50
     1             NVAR,JWPUT,JINITT,JMINT,JMAXT,JOLDT,JNEWT,JDRV,      READY   51
     2             JDRVO,JSPR1,JSPR2,JSPR3                              READY   52
      COMMON/SIZES/ NSTMEM,NSTDOF,NDYDOF,NNOPT,NDESNO,NDESYS            READY   53
      COMMON/PLACES/ IUIN1,IUIN2,IUOUT1,IUOUT2,IUGO1,IUGO2,IUGO3,IUGO4, READY   54
     1               IUSCR,IFSCR,IFS1,IFS2,IFS3,IFS4,IUCD,IUPR,         READY   55
     2               IUA,IFA,IUY,IFY,IUMEMN,IFMEMN,IUSTFN,IFSTFN,       READY   56
     3               IUKS,IFKS,IUB,IFB,IUDESO,IFDESO,                   READY   57
     4               IUMDBI,IFMDBI,IUADDI,IFADDI,IUBALI,IFBALI,         READY   58
```

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     5          IUDESI,IFDESI,IUWTI,IFWTI,                          READY
     6          IUMEMO,IFMEMO,IUBT,IFBT,                            READY
     7          IUDESN,IFDESN,IUMD,IFMD,                            READY
     8          IUMEMF,IFMEMF,                                      READY
     9          IUSTFO,IFSTFO,IUMDB,IFMDB,IUADD,IFADD,IUBAL,IFBAL,  READY
     A          IUDESF,IFDESF,IUWT,IFWT,                            READY
     B          IUDUM1,IFDUM1,IUDUM2,IFDUM2,IUDUM3,IFDUM3,          READY
     C          IUL,IFL,IUYT,IFYT,IUZ,IFZ,IUZR,IFZR,IULR,IFLR,      READY
     D          IUBR,IFBR,                                          READY
     E          IUPHTF,IFPHTF,IUMODM,IFMODM,                        READY
     F          IUMODK,IFMODK,IUPHT,IFPHT,IUQT,IFQT,IUQ,IFQ,        READY
     G          IUPH,IFPH,IUINCM,IFINCM,IUINCK,IFINCK               READY
      COMMON/KLUES/ KLUSE,KLUNAL,IRED,KLUMD,KLUBAL,MSADD,NPASS,IDNOPT, READY
     1             VDES,EPS1,DWMAX,NBAR,NFIX,D,DEL,EPS2,NCYC,NNN,IDAND, READY
     2              IFIN,KLUB,KLUQ,MORBAL,DBAL                      READY
      COMMON/WAYTS/ WINITT,WST,WMB,WBOTH,WPRES,DW                   READY
      COMMON /CBYTES/ NBYTES                                        READY
      COMMON /FILE  / IPOS                                          READY
      COMMON /CORE  / KORE  ,KOREDP                                 READY
      COMMON /CLIST / KOUNT ,KPAGE ,LINES ,LINEST,KLABEL,KTPAGE,NPAGE READY
     1                ,KBPAGE,LINESG,KOUNTH,KOUNTI                  READY
      COMMON /STORES/ NUMSTR,KCONST,ISTDOF(5,6),IDYDOF(5,6),IDSTR(5) READY
     A                ,STRWI(5),STRWO(5),STRWN(5),STRII(5,3),STRIO(5,3) READY
     B                ,STRIN(5,3),STRRI(5,3),STRRO(5,3),STRRN(5,3)  READY
     C                ,STRWDO(5),STRWDN(5),STRIDO(5,3),STRIDN(5,3)  READY
     D    ,STRRDO(5,3),STRRDN(5,3),SCALE(5,13)                      READY
     E    ,STRFI(5,6),STRFO(5,6),STRFN(5,6)                         READY
     F    ,STRFDO(5,6),STRFDN(5,6)                                  READY
      COMMON /STRCLU/ ICYCLE,ISTEP,M1,M2,M3,M4,VS,VOLD,VNEW,STPOLD  READY
      COMMON /LOCSTR/ IUSTRI,IFSTRI,IUMREF,IFMREF                   READY
     1                ,IUMOD,IFMOD                                  READY
      COMMON/RESIZE/ ISIZE,SCLNEW(5,4),SCLOLD(5,4),ITESTO,SAVSTP,IDUB READY
      COMMON/ACCEL/ ISTOP,IPAR,DWNEW(5),DINEW(5,3),DWOLD(5),DIOLD(5,3) READY
     1              ,RILSTP                                         READY
      COMMON/COMRWP/ ITAPER,ITAPEW,ITAPEP                           READY
      COMMON/CTAPES/ ITAPES(50)                                     READY
      COMMON/ INVERT / INVERT,IUA2,IFLEX,AORD(30),IPERM(30),NSTOR(30,2) READY
     A,IPREV,NDOFT                                                  READY
      COMMON/ VSAVE / VNSAVE, VOSAVE                                READY
      COMMON /CLUEV/ LKLUEV,KLUEV(20)                               READY
C                                                                   READY
      DATA NAME /4HMEMB,4HERS /                                     READY
      DATA NAM1/4HDESA,4HRRAY/                                      READY
      DATA NAMFLX /4HDYNF,4HLEX /                                   READY
C                                                                   READY
      KORE = 28000                                                  READY
      KOREDP=KORE/2                                                 READY
C                                                                   READY
CCDC  BEGINNING OF STATEMENTS ASSOCIATED WITH CDC COMPUTER PROGRAMS READY
      KOREDP=KORE                                                   READY
CCDC  ENDING OF STATEMENTS ASSOCIATED WITH CDC COMPUTER PROGRAMS    READY
C                                                                   READY
C                                                                   READY
      CALL PROGNA(4H(REA,4HDY ))                                    READY
      KOUNT=LINES                                                   READY
      CALL MESAGE(1,5,5HREADY)                                      READY
      CALL TIMEB(10,10HFROM READY)                                  READY
```

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      C                                                                 READY     116
      C  ***************************************************           READY     117
      C  *      THE FOLLOWING LINE OF FASTOP CODE HAS          *        READY     118
      C  *      BEEN COMMENTED OUT BECAUSE IT IS NOT           *        READY     119
      C  *      USED IN THE CURRENT VERSION OF ESP.            *        READY     120
      C  ***************************************************           READY     121
      C     CALL OSIOPT                                                 READY     122
      C                                                                 READY     123
      C INITIALIZATIONS                                                 READY     124
      C                                                                 READY     125
      CIBM                                                              READY     126
      C     IFLEXS = 8                                                  READY     127
      CIBM                                                              READY     128
      CCDC                                                              READY     129
            IFLEXS = 5                                                  READY     130
      CCDC                                                              READY     131
            IFLEXI = 20                                                 READY     132
            IT=26                                                       READY     133
            IMINT=84                                                    READY     134
            IMAXT=85                                                    READY     135
            IDENS=94                                                    READY     136
            IOLDT=97                                                    READY     137
            IOLDW=96                                                    READY     138
            ISRAT=95                                                    READY     139
            IMINTO=99                                                   READY     140
            IINITT=98                                                   READY     141
            IWPUT=100                                                   READY     142
      C                                                                 READY     143
            NVAR=12                                                     READY     144
            JWPUT=2                                                     READY     145
            JINITT=3                                                    READY     146
            JMINT=4                                                     READY     147
            JMAXT=5                                                     READY     148
            JOLDT=6                                                     READY     149
            JNEWT=7                                                     READY     150
            JDRV=8                                                      READY     151
            JDRVO=9                                                     READY     152
            JSPR1=10                                                    READY     153
            JSPR2=11                                                    READY     154
            JSPR3=12                                                    READY     155
      C                                                                 READY     156
            IF(NCYC.GT.O) GO TO 95                                      READY     157
            NCYC=O                                                      READY     158
            IBAND=O                                                     READY     159
            IFIN=KLUSE                                                  READY     160
      C                                                                 READY     161
            KLUB=O                                                      READY     162
      C  ***************************************************           READY     163
      C  *      KLUB IS ALWAYS SET TO ZERO IN THE CURRENT      *        READY     164
      C  *      VERSION OF ESP.  THIS CAUSES CERTAIN           *        READY     165
      C  *      OPERATIONS IN READY, AFOM, AND DRVTV           *        READY     166
      C  *      TO BE BY-PASSED.                               *        READY     167
      C  *      (IN FASTOP, THE ABOVE STATEMENT IS             *        READY     168
      C  *      'KLUB=1'.)                                     *        READY     169
      C  ***************************************************           READY     170
      C                                                                 READY     171
            IF(IRED.EQ.O) KLUB=O                                        READY     172
```

```
      IF(KLUSE.LE.O.AND.NPASS.EQ O.AND.KLUMD.EQ.1) KLUB=O                READY     173
C                                                                        READY     174
      KLUQ=1                                                             READY     175
      IF(IRED.EQ.O.OR.KLUSE.LE.O) KLUQ=O                                 READY     176
C                                                                        READY     177
C ASSIGN UNITS AND FILES                                                 READY     178
C                                                                        READY     179
      CALL UNFIL(O)                                                      READY     180
      CALL PROGNA(4H(REA,4HDY ))                                         READY     181
C                                                                        READY     182
C                                                                        READY     183
C DETERMINE THE FOLLOWING- 1) NUMBER OF STRUCTURAL MEMBERS               READY     184
C                             (NOT USED IN ESP)                          READY     185
C                          2) NUMBER OF STRUCTURAL DEGREES OF FREEDOM    READY     186
C                             (NOT USED IN ESP)                          READY     187
C                          3) NUMBER OF DYNAMIC DEGREES OF FREEDOM       READY     188
C                             (NDYDOF)                                   READY     189
C                          4) SOURCE OF DYNAMIC FLEXIBILITY MATRIX       READY     190
C                             (IDYFLX)                                   READY     191
C                          5) SOURCE OF DYNAMIC MASS MATRIX AND,         READY     192
C                             IF FREE-FREE ANALYSIS, PLUG MASS MATRIX    READY     193
C                             (IMASS)                                    READY     194
C                          6) SOURCE OF TRANSFORMATION MATRIX FROM       READY     195
C                             RELATIVE TO ABSOLUTE COORDINATES           READY     196
C                             (ITRNSF)                                   READY     197
C                                                                        READY     198
C     IF SOURCE OF A MATRIX IS CARD IMAGES, CORRESPONDING INDEX = O.     READY     199
C                                                                        READY     200
C     IF SOURCE IS OUTPUT4 ROUTINE IN MSC NASTRAN, INDEX = 1.            READY     201
C       FLEXIBILITY MATRIX, DYNAMIC MASS MATRIX, AND TRANSFORMATION      READY     202
C       MATRIX MUST BE SEPARATE FILES; PLUG MASS MATRIX, IF USED, MUST   READY     203
C       BE APPENDED TO FILE CONTAINING DYNAMIC MASS MATRIX.              READY     204
C       FLEXIBILITY, TRANSFORMATION, AND PLUG MASS MATRICES MUST BE      READY     205
C       WRITTEN WITH NONSPARSE OPTION; DYNAMIC MASS MATRIX MUST BE       READY     206
C       WRITTEN WITH SPARSE OPTION.                                      READY     207
C                                                                        READY     208
C     IF SOURCE IS OUTPUT2 ROUTINE IN COSMIC NASTRAN, INDEX = 2.         READY     209
C       ALL MATRICES MUST BE WRITTEN ON THE SAME I/O UNIT                READY     210
C       (DEFAULT CAPABILITY IN COSMIC NASTRAN); FILE REWIND              READY     211
C       SHOULD PRECEDE MATRIX WRITE OPERATIONS (P1=-1).                  READY     212
C       ORDER SHOULD BE: (1) FLEXIBILITY MATRIX, (2) DYNAMIC             READY     213
C       MASS MATRIX, AND, IF USED, (3) TRANSFORMATION MATRIX AND         READY     214
C       (4) PLUG MASS MATRIX.                                            READY     215
C                                                                        READY     216
      READ (IUCD,9000) NDYDOF,IDYFLX,IMASS,ITRNSF                        READY     217
C                                                                        READY     218
C     IN NASTRAN, MATRICES ARE WRITTEN BY COLUMNS.                       READY     219
C     IN ESP, FLEXIBILITY AND MASS MATRICES ARE NEEDED BY ROWS.          READY     220
C     SYMMETRY PROPERTY IS USED TO AVOID TAKING TRANSPOSE.               READY     221
C                                                                        READY     222
C                                                                        READY     223
C   *****************************************************                READY     224
C   *       THE FOLLOWING LINES OF FASTOP CODE HAVE        *             READY     225
C   *       BEEN COMMENTED OUT BECAUSE THEY ARE NOT        *             READY     226
C   *       USED IN THE CURRENT VERSION OF ESP.            *             READY     227
C   *****************************************************                READY     228
```

```
C     IPOS(IUMEMN)=IFMEMN
C     CALL GEDLAB(8HREADY 01,IUMEMN,NAME,IFMEMN,KROW,KCOL)
C     NSTMEM=KROW
C     CALL DCLOSE(IUMEMN)
C     IF(IRED.EQ.0) GO TO 40
C     IPOS(IUY)=IFY
C     CALL GEDLAB(8HREADY 02,IUY,NAME,IFY,KROW,KCOL)
C     NSTDOF=KROW
C     NDYDOF=KCOL
C     CALL DCLOSE(IUY)
C     GO TO 50
C  40 IPOS(IUKS)=IFKS
C     CALL GEDLAB(8HREADY 03,IUKS,NAME,IFKS,KROW,KCOL)
C     NSTDOF=KROW
C     NDYDOF=NSTDOF
C
C  50 CONTINUE
C
C
C     IF(KLUNAL.EQ.0) GO TO 95
C     IF(NPASS.EQ.0.AND.KLUSE.LT.2) GO TO 95
C
C LIST STRESS RATIOS FOR STRUCTURAL ELEMENTS WHICH ARE FREE TO BE
C RESIZED IN SOP.
C
C     CALL GEDLAB(8HREADY 04,IUMEMN,NAME,IFMEMN,KROW,KCOL)
C     KOUNT=LINES
C     NFREE=0
C     K=0
C
C     DO 90 I=1,KROW
C     IR=I
C     CALL GETROW(IUMEMN,1,BUFFER,KCOL)
C     IF(BUFFER(IMINT).EQ.BUFFER(IMAXT)) GO TO 60
C     K=K+1
C     NFREE=NFREE+1
C     NUMB(K)=IBUF
C     VALUE(K)=BUFFER(ISRAT)
C  60 IF(K.EQ.5) GO TO 65
C     IF(IR.EQ.KROW.AND.K.GT.0) GO TO 65
C     GO TO 90
C  65 CALL TITLES(2)
C     IF(KOUNT.GT.KOUNTH) GO TO 70
C     WRITE(IUPR,9004)
C     KOUNT=KOUNT+5
C  70 WRITE(IUPR,9005) (NUMB(L),VALUE(L),L=1,K)
C     KOUNT=KOUNT+1
C     K=0
C  90 CONTINUE
C
C  ******************************************************
C  *        END OF CODE THAT HAS BEEN COMMENTED OUT.     *
C  ******************************************************
C
C     READ DYNAMIC FLEXIBILITY MATRIX FROM EXTERNAL SOURCE
C     (VIA UNIT 20), AND WRITE ON FILE 1 OF UNIT 8.
C
```

```
      KCOL = NDYDOF
      KROW = NDYDOF
      REWIND IFLEXI
      CALL PUDLAB (8HREADY 12,IFLEXS,NAMFLX,1,KROW,KCOL)
      IF (IDYFLX.NE.O)
     1CALL NASTRD (IDYFLX,IFLEXI,1,1,1,NDYDOF,NDYDOF,BUFFER)
      IF (IDYFLX.EQ.O.AND.KLUEV(7).EQ.2)
     1WRITE (6,9027) KROW,KCOL
      DO 92 I=1,KROW
      IF (IDYFLX.EQ.O)
     1READ (IFLEXI,9026) (BUFFER(K),K=1,KCOL)
      IF (IDYFLX.EQ.O.AND.KLUEV(7).EQ.2)
     1WRITE (6,9028) I,(BUFFER(K),K=1,KCOL)
      IF (IDYFLX NE.O)
     1CALL NASTRD (IDYFLX,IFLEXI,1,1,2,NDYDOF,NDYDOF,BUFFER)
      CALL PUTROW (IFLEXS,-1,BUFFER,KCOL)
   92 CONTINUE
      CALL DCLOSE (IFLEXS)
      IF (IDYFLX.EQ.2)
     1CALL NASTRD (IDYFLX,IFLEXI,1,1,3,NDYDOF,NDYDOF,BUFFER)
C
   95 CONTINUE
C
C
      IF(NPASS.NE.O) GO TO 400
      IF(NCYC.GT O) GO TO 700
C
C ****************************************************
C *       THE FOLLOWING LINES OF FASTOP CODE HAVE      *
C *       BEEN COMMENTED OUT BECAUSE THEY ARE NOT      *
C *       USED IN THE CURRENT VERSION OF ESP.          *
C ****************************************************
C
C NPASS=O  DO SOME OR ALL OF THE FOLLOWING-DEPENDING ON THE CURRENT
C USE OF THE PROGRAM.
C
C 1. IF NON-OPTIMUM FACTORS AND/OR FIXED GAGE ELEMENTS ARE PRESENT,
C    READ ASSOCIATED DATA INTO CORE.
C 2. IF NON-OPT FACTORS ARE PRESENT, UPDATE ELEMENT STIFFNESS FILE.
C 3. UPDATE THE MEMBER MATRIX.
C      A. COPY ORIGINAL SET OF MINIMUM ALLOWABLE GAGES ONTO COL IMINTO.
C    B. COPY SET OF CURRENT GAGES ONTO COL IINITT.
C     C. INSERT WEIGHT PER UNIT GAGE INTO COL IWPUT.
C 4. CONSTRUCT THE DESIGN ARRAY.
C 5. READ IN MASS BALANCE DATA(CARDS)-IF ANY.
C
C     NNOPT=O
C     NDESNO=O
C
C     IF(IDNOPT.NE.1) GO TO 145
C
C     K=O
C     NBAD=O
C 100 READ(IUCD,9002) (MUMJ(I),IDJ(I),FACTJ(I),I=1,4)
C     IF(MUMJ(1).EQ.O) GO TO 115
C     DO 110 I=1,4
C     IF(MUMJ(I).EQ.O) GO TO 100
```

```
      C      IF(K.EQ.O) GO TO 106                                          READY
      C      DO 104 L=1,KMAX                                               READY
      C      IF(MUMJ(I).NE.JCHART(1,L)) GO TO 104                          READY
      C      IF(NBAD.EQ.O) KOUNT=LINES                                     READY
      C      NBAD=NBAD+1                                                   READY
      C      LEFT=LINES-KO NT                                              READY
      C      IF(LEFT.LT.3) KOUNT=LINES                                     READY
      C      CALL TITLES(2)                                                READY
      C      WRITE(IUPR,9023) MUMJ(I)                                      READY
      C      KOUNT=KOUNT+3                                                 READY
      C      GO TO 110                                                     READY
      C  104 CONTINUE                                                      READY
      C                                                                    READY
      C  106 CONTINUE                                                      READY
      C      K=K+1                                                         READY
      C      KMAX=K                                                        READY
      C      JCHART(1,K)=MUMJ(I)                                           READY
      C      JCHART(2,K)=IDJ(I)                                            READY
      C      CHART(3,K)=FACTJ(I)                                           READY
      C      CHART(4,K)=0.0                                                READY
      C      IF(JCHART(2,K).EQ.1) NDESNO=NDESNO+1                          READY
      C      IF(CHART(3,K).NE.O..AND.CHART(3,K).NE.1.) NNOPT=NNOPT+1       READY
      C  110 CONTINUE                                                      READY
      C      GO TO 100                                                     READY
      C                                                                    READY
      C  115 CONTINUE                                                      READY
      C                                                                    READY
      C                                                                    READY
      C      DO 140 NTIME=1,2                                              READY
      C      NMAX=10                                                       READY
      C      IF(NTIME.EQ.2) NMAX=6                                         READY
      C      IF(NTIME.EQ.1.AND.NDESNO.EQ.O) GO TO 140                      READY
      C      IF(NTIME.EQ.2.AND.NNOPT.EQ.O)  GO TO 140                      READY
      C      KOUNT=LINES                                                   READY
      C      J=0                                                           READY
      C                                                                    READY
      C      DO 135 K=1,KMAX                                               READY
      C      I=JCHART(1,K)                                                 READY
      C      M=JCHART(2,K)                                                 READY
      C      A=CHART(3,K)                                                  READY
      C      IF(NTIME.EQ.1.AND.M.NE.1) GO TO 120                           READY
      C      IF(NTIME.EQ.2.AND.(A.EQ.O..OR.A.EQ.1.)) GO TO 120             READY
      C      J=J+1                                                         READY
      C      NUMB(J)=I                                                     READY
      C      IF(NTIME.EQ.2) VALUE(J)=A                                     READY
      C  120 CONTINUE                                                      READY
      C      IF(J.EQ.NMAX) GO TO 125                                       READY
      C      IF(K.EQ.KMAX.AND.J.GT.O) GO TO 125                            READY
      C      GO TO 135                                                     READY
      C  125 CALL TITLES(2)                                                READY
      C      IF(KOUNT.GT.KOUNTH) GO TO 130                                 READY
      C      IF(NTIME.EQ.1) WRITE(IUPR,9006)                               READY
      C      IF(NTIME.EQ.2) WRITE(IUPR,9007)                               READY
      C      KOUNT=KOUNT+5                                                 READY
      C  130 IF(NTIME.EQ.1) WRITE(IUPR,9008) (NUMB(L),L=1,J)               READY
      C      IF(NTIME.EQ.2) WRITE(IUPR,9009) (NUMB(L),VALUE(L),L=1,J)      READY
      C      KOUNT=KOUNT+1                                                 READY
```

```
C     J=0                                                           READY    401
C 135 CONTINUE                                                      READY    402
C                                                                   READY    403
C     LEFT=LINES-KOUNT                                              READY    404
C     IF(LEFT.GE.3) GO TO 138                                       READY    405
C     KOUNT=LINES                                                   READY    406
C     CALL TITLES(2)                                                READY    407
C 138 IF(NTIME.EQ.1) WRITE(IUPR,9010) NDESNO                        READY    408
C     IF(NTIME.EQ.2) WRITE(IUPR,9011) NNOPT                         READY    409
C     KOUNT=KOUNT+3                                                 READY    410
C 140 CONTINUE                                                      READY    411
C                                                                   READY    412
C                                                                   READY    413
C 145 CONTINUE                                                      READY    414
C                                                                   READY    415
C  ****************************************************             READY    416
C  *       END OF CODE THAT HAS BEEN COMMENTED OUT.       *         READY    417
C  ****************************************************             READY    418
C                                                                   READY    419
C ASSIGN UNITS AND FILES.                                           READY    420
C                                                                   READY    421
      CALL UNFIL(-1)                                                READY    422
C                                                                   READY    423
      CALL PROGNA(4H(REA,4HDY ))                                    READY    424
C                                                                   READY    425
C  ****************************************************             READY    426
C  *       THE FOLLOWING LINES OF FASTOP CODE HAVE        *         READY    427
C  *       BEEN COMMENTED OUT BECAUSE THEY ARE NOT        *         READY    428
C  *       USED IN THE CURRENT VERSION OF ESP.            *         READY    429
C  ****************************************************             READY    430
C     IF(KLUSE.NE.2.AND.KLUMD.EQ.1.AND.NNOPT.EQ.0) GO TO 220        READY    431
C                                                                   READY    432
C     IUSTFN=IUDUM3-IUSTFN                                          READY    433
C     IUSTFO=IUDUM3-IUSTFO                                          READY    434
C     IFSTFN=IFDUM3-IFSTFN                                          READY    435
C     IFSTFO=IFDUM3-IFSTFO                                          READY    436
C                                                                   READY    437
C     CALL GEDLAB(8HREADY 05,IUSTFO,NAME,IFSTFO,MROW,MCOL)          READY    438
C     CALL PUDLAB(8HREADY 01,IUSTFN,NAME,IFSTFN,MROW,MCOL)          READY    439
C                                                                   READY    440
C     DO 200 I=1,NSTMEM                                             READY    441
C     CALL PREAD(IUSTFO,PATTY(1),24)                                READY    442
C     IF(IDNOPT.NE.1) GO TO 180                                     READY    443
C     IF(I.GT.KMAX)GO TO 150                                        READY    444
C     IF(MEM.NE.JCHART(1,I)) GO TO 150                              READY    445
C     J=I                                                           READY    446
C     GO TO 170                                                     READY    447
C 150 CONTINUE                                                      READY    448
C     DO 160 K=1,KMAX                                               READY    449
C     IF(MEM.NE.JCHART(1,K)) GO TO 160                              READY    450
C     J=K                                                           READY    451
C     GO TO 170                                                     READY    452
C 160 CONTINUE                                                      READY    453
C     GO TO 180                                                     READY    454
C                                                                   READY    455
C 170 CONTINUE                                                      READY    456
C     AA=CHART(3,J)                                                 READY    457
```

```
               1          48H DYNAMIC FLEXIBILITY MATRIX FROM CARD-IMAGE FILE)       READY    1199
             9028 FORMAT (//15X,4HROW .I3//(1P10E12 4))                              READY    1200
 1200       C                                                                        READY    1201
             9999 CONTINUE                                                           READY    1202
            C                                                                        READY    1203
            C                                                                        READY    1204
                  RETURN                                                             READY    1205
 1205             END                                                                READY    1206


      SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS     DEF LINE     REFERENCES
    1  READY          1       1204

VARIABLES      SN  TYPE            RELOCATION
  2024  A          REAL                         REFS       699      700      701  DEFINED      684
     3  AORD       REAL      ARRAY     INVERT   REFS        94
  2033  ASTEP      REAL                         REFS       766  DEFINED      764      767
 71402  B          REAL      ARRAY              REFS        19      706      707      708  DEFINED      684
  2071  BUFFER     REAL      ARRAY              REFS        11       24      290      297      299      301      304
                                                1101   DEFINED      295
 71405  C          REAL      ARRAY              REFS        19      711      712      713  DEFINED      684
  2557  CHART      REAL      ARRAY              REFS        12       24
    15  D          REAL                KLUES    REFS        70
    27  DBAL       REAL                KLUES    REFS        70
    16  DEL        REAL                KLUES    REFS        70
     7  DINEW      REAL      ARRAY     ACCEL    REFS        90
    33  DIOLD      REAL      ARRAY     ACCEL    REFS        90
 71442  DMAPNM     REAL     *UNDEF              REFS        22
   215  DRVMB      REAL      ARRAY     BAL      REFS        37
   241  DRVMBO     REAL      ARRAY     BAL      REFS        37
  2043  DSTFX      REAL                         REFS       790     1045  DEFINED      784     1039
  2046  DSTFXX     REAL                         REFS       790     1045  DEFINED      787     1042
  2044  DSTFY      REAL                         REFS       790     1045  DEFINED      785     1040
  2047  DSTFYY     REAL                         REFS       790     1045  DEFINED      788     1043
  2045  DSTFZ      REAL                         REFS       790     1045  DEFINED      786     1041
  2050  DSTFZZ     REAL                         REFS       790     1045  DEFINED      789     1044
  2035  DSTIX      REAL                         REFS       790     1045  DEFINED      778     1033
  2036  DSTIY      REAL                         REFS       790     1045  DEFINED      779     1034
  2037  DSTIZ      REAL                         REFS       790     1045  DEFINED      780     1035
  2040  DSTRX      REAL                         REFS       790     1045  DEFINED      781     1036
  2041  DSTRY      REAL                         REFS       790     1045  DEFINED      782     1037
  2042  DSTRZ      REAL                         REFS       790     1045  DEFINED      783     1038
  2034  DSTW       REAL                         REFS       790     1045  DEFINED      777     1032
     5  DW         REAL                WAYTS    REFS        73
    12  DWMAX      REAL                KLUES    REFS        70
     2  DWNEW      REAL      ARRAY     ACCEL    REFS        90
    26  DWOLD      REAL      ARRAY     ACCEL    REFS        90
  2025  E          REAL                         REFS       687  DEFINED      685
    11  EPS1       REAL                KLUES    REFS        70
    17  EPS2       REAL                KLUES    REFS        70
 71374  F          REAL      ARRAY              REFS        18      689  DEFINED      685
 71??7  FACT I     REAL     *UNDEF              REFS        1?
```

```
      9006 FORMAT(/,10X,   45HMEMBERS TO BE EXCLUDED FROM FLUTTER REDESIGN ,  READY    1142
          1                  7HPROCESS,                                        READY    1143
          2     //,10X,10(4X,6HMEMBER),/)                                      READY    1144
      9007 FORMAT(/,10X,   43HMEMBERS FOR WHICH NON-OPTIMUM FACTORS HAVE ,    READY    1145
          1                 14HBEEN SPECIFIED,                                 READY    1146
          2    //,10X,  6(20H    MEMBER    FACTOR),/)                          READY    1147
      9008 FORMAT(10X,10I10)                                                   READY    1148
      9009 FORMAT(10X,6(I10,F10.3))                                            READY    1149
      9010 FORMAT(//,10X,I5,    38H MEMBERS ARE EXCLUDED FROM THE FLUTTER,     READY    1150
          1                      17H REDESIGN PROCESS)                         READY    1151
      9011 FORMAT(//,10X,  43HNON-OPTIMUM FACTORS HAVE BEEN SPECIFIED FOR,I5,  READY    1152
          1                 8H MEMBERS)                                        READY    1153
      9012 FORMAT(/,10X,   17HDESIGN ARRAY DATA,//,                            READY    1154
          1          10X,5H MEMB,                                              READY    1155
          2          8X,5H NEWT,                                               READY    1156
          3          10X,5H OLDT,                                              READY    1157
          4          10X,5HINITT,                                              READY    1158
          5          10X,5H MINT,                                              READY    1159
          6          10X,5H MAXT,                                              READY    1160
          7          10X,5H WPUT,4X,5H MEMB,/)                                 READY    1161
      9013 FORMAT(10X,I5,6F15.4,I7)                                            READY    1162
      9014 FORMAT(/,10X,   25HINITIAL MASS BALANCE DATA,                       READY    1163
          1     //,10X,    8H  NUMBER,9X,6HWEIGHT,3(5X,3HDOF),/)               READY    1164
      9015 FORMAT(10X,I8,F15.4,3I8,/)                                          READY    1165
      9016 FORMAT(/,10X,   27HTOTAL MASS BALANCE WEIGHT =,F15.4)               READY    1166
      9017 FORMAT(/,10X,   25HCURRENT MASS BALANCE DATA,/)                     READY    1167
      9018 FORMAT(10X,49HTHE OLD MASS BALANCE DATA HAS BEEN SUPERSEDED BY ,   READY    1168
          1                9HTHIS DATA,//)                                     READY    1169
      9019 FORMAT(/,10X,    8H  NUMBER,   15H   INITIAL WGHT,                  READY    1170
          1                 20H          CURRENT WGHT,3(5X,3HDOF),/)           READY    1171
      9020 FORMAT(10X,I8,F15.4,F20.4,3I8,/)                                    READY    1172
      9021 FORMAT(/,10X,   34H**********WEIGHT SUMMARY**********,/)            READY    1173
      9022 FORMAT (/,10X,42HINITIAL REFERENCE WEIGHT..................,F12.4, READY    1174
          1        //,10X,42HWEIGHT CHANGE IN LAST PASS THROUGH SOP....,F12.4, READY    1175
          2        //,10X,42HCUMULATIVE STRUCT. WEIGHT CHANGE..........,F12.4, READY    1176
          3        //,10X,42HCUMULATIVE MASS BAL. WEIGHT CHANGE........,F12.4, READY    1177
          4        //,10X,42HCUMULATIVE TOTAL WEIGHT CHANGE............,F12.4, READY    1178
          5        //,10X,42HPERCENTAGE WEIGHT CHANGE (CUMULATIVE).....,F12.4, READY    1179
          6        //,10X,42HTOTAL NEW WEIGHT..........................,F12.4, READY    1180
          7        /)                                                          READY    1181
      9023 FORMAT(10X, 6HMEMBER,I5, 33H APPEARS REDUNDANTLY IN THE DATA ,     READY    1182
          1              45HBLOCK ASSOCIATED WITH NON-OPT FACTORS AND/OR ,     READY    1183
          2              32HEXCLUSION FROM FLUTTER REDESIGN.,                  READY    1184
          3      /,10X,43HTHE INITIAL DATA IS BEING ACCEPTED AND THE ,         READY    1185
          4              49HREDUNDANT DATA IS BEING IGNORED. CHECK THE INPUT , READY    1186
          5               5HDATA.,/)                                           READY    1187
      9024 FORMAT(10X,47HTHE FOLLOWING MEMBERS APPEAR IN THE DATA BLOCK ,     READY    1188
          1              49HASSOCIATED WITH NON-OPT FACTORS AND/OR EXCLUSION , READY    1189
          2              22HFROM FLUTTER REDESIGN.,                            READY    1190
          3      /,10X,49HHOWEVER, THERE ARE NO SUCH MEMBER NUMBERS IN THE ,   READY    1191
          4               9HSTRUCTURE,/)                                       READY    1192
      9025 FORMAT(10X,49HEXECUTION TERMINATES DUE TO ERRORS IN DATA BLOCK ,   READY    1193
          1              50HFOR NON-OPT FACTORS AND/OR EXCLUSION FROM FLUTTER , READY   1194
          2               9HREDESIGN.,                                         READY    1195
          3      /,10X,17HCHECK INPUT DATA.,/)                                 READY    1196
      9026 FORMAT (3(8X,1PE15.5,1X))                                           READY    1197
      9027 FORMAT (1H1,9X,8HREADING ,I3,3H X ,I3                               READY    1198
```

```
C     CALL PROGNA(4H(REA,4HDY ))
C
C ADJUST SCRATCH FILES ON UNITS CONTAINING B AND BT.
C
C     CALL UNFIL(1)
C
C     CALL PROGNA(4H(REA,4HDY ))
C
C 750 CONTINUE
C
C  ****************************************************
C  *        END OF CODE THAT HAS BEEN COMMENTED OUT.    *
C  ****************************************************
C
C CALL THE MASS SUBROUTINE TO OBTAIN THE DYNAMIC MASS MATRIX MD.
C
  760 CONTINUE
      CALL DYNMAS(WORK,KORE,BUFFER,IERR,IDYFLX,IMASS,ITRNSF)
C
      CALL PROGNA(4H(REA,4HDY ))
C
C  ****************************************************
C  *        THE FOLLOWING LINES OF FASTOP CODE HAVE     *
C  *        BEEN COMMENTED OUT BECAUSE THEY ARE NOT     *
C  *        USED IN THE CURRENT VERSION OF ESP.         *
C  ****************************************************
C
C IF KLUB=1 READJUST SCRATCH FILE ON UNIT CONTAINING BT.
C
C     IF(KLUB.EQ.0) GO TO 770
C
C     CALL UNFIL(2)
C
C     CALL PROGNA(4H(REA,4HDY ))
C
C 770 CONTINUE
C
C  ****************************************************
C  *        END OF CODE THAT HAS BEEN COMMENTED OUT.    *
C  ****************************************************
C
C SET UNITS AND FILES FOR VIBRATION OUTPUT.
C
      CALL UNFIL(25)
C
      CALL PROGNA(4H(REA,4HDY ))
      CALL TIMEB(10,10HFROM READY)
      CALL MESAGE(2,5,5HREADY)
C
C
 9000 FORMAT(4I5)
 9002 FORMAT(4(2I5,F10.3))
 9003 FORMAT(I5,F15.5,3I5)
 9004 FORMAT(/,10X,   44HSTRESS RATIOS OF ACTIVE STRUCTURAL ELEMENTS ,
     1                6HIN SOP,
     2      //,10X, 5(20H MEMB   STRESS RATIO,4X),/)
 9005 FORMAT(10X,5(I5,F15.5,4X))
```

```
      IF (KLUSE.LE.0)  GO TO 760
C
      DO 680 I=1,NUMSTR
      WRITE(IUPR,9051) IDSTR(I),(IDYDOF(I,K),K=1,6)
      WRITE(IUPR,9052)
      DSTW=STRWN(I)-STRWI(I)
      DSTIX=STRIN(I,1)-STRII(I,1)
      DSTIY=STRIN(I,2)-STRII(I,2)
      DSTIZ=STRIN(I,3)-STRII(I,3)
      DSTRX = STRRN(I,1) - STRRI(I,1)
      DSTRY = STRRN(I,2) - STRRI(I,2)
      DSTRZ = STRRN(I,3) - STRRI(I,3)
      DSTFX = STRFN(I,1) - STRFI(I,1)
      DSTFY = STRFN(I,2) - STRFI(I,2)
      DSTFZ = STRFN(I,3) - STRFI(I,3)
      DSTFXX = STRFN(I,4) - STRFI(I,4)
      DSTFYY = STRFN(I,5) - STRFI(I,5)
      DSTFZZ = STRFN(I,6) - STRFI(I,6)
      WRITE(IUPR,9053) STRWI(I),STRWN(I),DSTW,
     1                 STRII(I,1),STRIN(I,1),DSTIX,
     2                 STRII(I,2),STRIN(I,2),DSTIY,
     3                  STRII(I,3),STRIN(I,3),DSTIZ,
     4                  STRRI(I,1),STRRN(I,1),DSTRX,
     5                  STRRI(I,2),STRRN(I,2),DSTRY,
     6                  STRRI(I,3),STRRN(I,3),DSTRZ
     7    ,STRFI(I,1),STRFN(I,1),DSTFX
     8    ,STRFI(I,2),STRFN(I,2),DSTFY
     9    ,STRFI(I,3),STRFN(I,3),DSTFZ
     A    ,STRFI(I,4),STRFN(I,4),DSTFXX
     B    ,STRFI(I,5),STRFN(I,5),DSTFYY
     C    ,STRFI(I,6),STRFN(I,6),DSTFZZ
  680 CONTINUE
C
C
C     READ DSM FROM UNIT IUA AND REPLACE MAIN DIAGONAL
C     TERMS OF STORE-ON-STORE PARTITION WITH NEW VALUES.
C
  701 CONTINUE
C
      CALL UPDATE( IUA, IUPR, NCYC )
C
C   ****************************************************
C   *        THE FOLLOWING LINES OF FASTOP CODE HAVE      *
C   *        BEEN COMMENTED OUT BECAUSE THEY ARE NOT      *
C   *        USED IN THE CURRENT VERSION OF ESP.          *
C   ****************************************************
C
C     IF(NCYC.GT.0) GO TO 750
C
C
C IF KLUB=1, OBTAIN TRANSFORMATION MATRIX B AND ITS TRANSPOSE BT.
C
C     IF(KLUB.EQ.0) GO TO 750
C
C     CALL BSOLVE(KORE,WORK)
C
```

```
C 530 CONTINUE                                                         READY    971
C     WMB=0.0                                                          READY    972
C     DO 540 I=1,NMBAL                                                 READY    973
C 540 WMB=WMB+VMBNEW(I)                                                READY    974
C                                                                      READY    975
C 600 CONTINUE                                                         READY    976
C                                                                      READY    977
C     IF(KLUBAL.EQ.0) GO TO 640                                        READY    978
C                                                                      READY    979
C     KOUNT=LINES                                                      READY    980
C     CALL TITLES(2)                                                   READY    981
C     WRITE(IUPR,9017)                                                 READY    982
C     KOUNT=KOUNT+3                                                    READY    983
C     IF(MORBAL.EQ.0) GO TO 610                                        READY    984
C     WRITE(IUPR,9018)                                                 READY    985
C     KOUNT=KOUNT+3                                                    READY    986
C 610 CONTINUE                                                         READY    987
C     WRITE(IUPR,9019)                                                 READY    988
C     KOUNT=KOUNT+3                                                    READY    989
C     DO 620 I=1,NMBAL                                                 READY    990
C     WRITE(IUPR,9020) IDBAL(I),VMBIN(I),VMBNEW(I),(MBDOF(I,J),J=1,3)  READY    991
C     KOUNT=KOUNT+2                                                    READY    992
C 620 CONTINUE                                                         READY    993
C                                                                      READY    994
C 640 CONTINUE                                                         READY    995
C                                                                      READY    996
C     WBOTH=WMB+WST                                                    READY    997
C     WPRES=WINITT+WBOTH                                               READY    998
C     WPCT=100.*(WBOTH/WINITT)                                         READY    999
C                                                                      READY   1000
C     KOUNT=LINES                                                      READY   1001
C     CALL TITLES(2)                                                   READY   1002
C     WRITE(IUPR,9021)                                                 READY   1003
C     KOUNT=KOUNT+3                                                    READY   1004
C     WRITE(IUPR,9022) WINITT,WCHNGE,WST,WMB,WBOTH,WPCT,WPRES          READY   1005
C     KOUNT=KOUNT+15                                                   READY   1006
C                                                                      READY   1007
C                                                                      READY   1008
C                                                                      READY   1009
C COMMON /STORES/ CONTAINS 277 WORDS                                   READY   1010
C COMMON /STRCLU/ CONTAINS 10 WORDS                                    READY   1011
C     CALL GEDLAB(8HREADY 50,IUSTRI,NAME,IFSTRI,MROW,MCOL)             READY   1012
C     NBYTE= 4*277                                                     READY   1013
C     CALL DREAD(IUSTRI,MSTOR(1),NBYTE)                                READY   1014
C     NBYTE= 4*10                                                      READY   1015
C     CALL DREAD(IUSTRI,KSTOR(1),NBYTE)                                READY   1016
C     CALL DCLOSE(IUSTRI)                                              READY   1017
C                                                                      READY   1018
C     KOUNT=LINES                                                      READY   1019
C     CALL TITLES(2)                                                   READY   1020
C                                                                      READY   1021
C  ******************************************************              READY   1022
C  *       END OF CODE THAT HAS BEEN COMMENTED OUT.     *              READY   1023
C  ******************************************************              READY   1024
C                                                                      READY   1025
  700 CONTINUE                                                         READY   1026
```

```
C      IF(SRMIN.LE.SZMIN) ROE(JMINT)=-SZMIN                          READY    914
C 440  CONTINUE                                                      READY    915
C      CALL TITLES(2)                                                READY    916
C      IF(KOUNT.GT.KOUNTH) GO TO 442                                 READY    917
C      WRITE(IUPR,9012)                                              READY    918
C      KOUNT=KOUNT+5                                                 READY    919
C      L=0                                                           READY    920
C 442  CONTINUE                                                      READY    921
C      AMINT=ABS(ROE(JMINT))                                         READY    922
C      WRITE(IUPR,9013) IROE,ROE(JNEWT),ROE(JOLDT),ROE(JINITT),      READY    923
C     1                     AMINT,ROE(JMAXT),ROE(JWPUT),IROE         READY    924
C      KOUNT=KOUNT+1                                                 READY    925
C      L=L+1                                                         READY    926
C      IF(L.LT.4) GO TO 443                                          READY    927
C      L=0                                                           READY    928
C      IF(KOUNT.EQ.LINES) GO TO 443                                  READY    929
C      CALL PLB(1,1,IUPR)                                            READY    930
C      KOUNT=KOUNT+1                                                 READY    931
C 443  CONTINUE                                                      READY    932
C      CALL PUTROW(IUDESN,2,ROE,KCOL)                                READY    933
C      LYNE=LYNE+1                                                   READY    934
C      GO TO 460                                                     READY    935
C 445  JUMP=1                                                        READY    936
C 460  CONTINUE                                                      READY    937
C                                                                    READY    938
C      CALL DCLOSE(IUDESI)                                           READY    939
C      CALL DCLOSE(IUDESN)                                           READY    940
C      CALL DCLOSE(IUMEMN)                                           READY    941
C                                                                    READY    942
C                                                                    READY    943
C      NMBAL=0                                                       READY    944
C      WMB=0.0                                                       READY    945
C      IF(KLUBAL.EQ.0) GO TO 480                                     READY    946
C      CALL GEDLAB(8HREADY 11,IUBALI,NAME,IFBALI,MROW,MCOL)          READY    947
C                                                                    READY    948
C   COMMON/BAL/ CONTAINS 241 WORDS                                   READY    949
C                                                                    READY    950
C      NBYTE=4*241                                                   READY    951
C      CALL DREAD(IUBALI,MB(1),NBYTE)                                READY    952
C      CALL DCLOSE(IUBALI)                                           READY    953
C                                                                    READY    954
C      DO 470 I=1,NMBAL                                              READY    955
C 470  WMB=WMB+VMBNEW(I)                                             READY    956
C                                                                    READY    957
C 480  CONTINUE                                                      READY    958
C                                                                    READY    959
C      WCHNGE=(WST+WMB)-WBOTH                                        READY    960
C                                                                    READY    961
C      IF(KLUBAL.EQ.0.OR.MORBAL.EQ.0) GO TO 600                      READY    962
C                                                                    READY    963
C 500  READ(IUCD,9003) I1,A1                                         READY    964
C      IF(I1.EQ.0) GO TO 530                                         READY    965
C      DO 520 I=1,NMBAL                                              READY    966
C      IF(I1.EQ.IDBAL(I)) VMBNEW(I)=A1                               READY    967
C 520  CONTINUE                                                      READY    968
C      GO TO 500                                                     READY    969
C                                                                    READY    970
```

```
C      CALL PREAD(IUSTFO,PATTY(1),24)                                  READY   857
C      CALL PRITE(IUSTFN,PATTY(1),24)                                  READY   858
C      NBYTE=4*NODES                                                   READY   859
C      CALL PREAD(IUSTFO,NSTART(1),NBYTE)                              READY   860
C      CALL PRITE(IUSTFN,NSTART(1),NBYTE)                              READY   861
C      CALL PREAD(IUSTFO,NGO(1),NBYTE)                                 READY   862
C      CALL PRITE(IUSTFN,NGO(1),NBYTE)                                 READY   863
C      NBYTE=NBYTES*IROW                                               READY   864
C      DO 410 J=1,ICOL                                                 READY   865
C      CALL PREAD(IUSTFO,ELSTF(1,J),NBYTE)                             READY   866
C 410  CALL PRITE(IUSTFN,ELSTF(1,J),NBYTE)                             READY   867
C      CALL REND(IUSTFO)                                               READY   868
C      CALL WEND(IUSTFN)                                               READY   869
C                                                                      READY   870
C 420  CONTINUE                                                        READY   871
C                                                                      READY   872
C      CALL DCLOSE(IUSTFO)                                             READY   873
C      CALL DCLOSE(IUSTFN)                                             READY   874
C                                                                      READY   875
C 430  CONTINUE                                                        READY   876
C                                                                      READY   877
C      IPOS(IUWTI)=IFWTI                                               READY   878
C      CALL GEDLAB(8HREADY 08,IUWTI,NAME,IFWTI,KROW,KCOL)              READY   879
C      NBYTE=4*6                                                       READY   880
C      CALL DREAD(IUWTI,WINITT,NBYTE)                                  READY   881
C      CALL DCLOSE(IUWTI)                                              READY   882
C                                                                      READY   883
C                                                                      READY   884
C      IPOS(IUDESI)=IFDESI                                             READY   885
C      IPOS(IUDESN)=IFDESN                                             READY   886
C      IPOS(IUMEMN)=IFMEMN                                             READY   887
C                                                                      READY   888
C      CALL GEDLAB(8HREADY 09,IUDESI,NAME,IFDESI,KROW,KCOL)            READY   889
C      CALL PUDLAB(8HREADY 05,IUDESN,NAME,IFDESN,KROW,KCOL)            READY   890
C      NDESYS=KROW                                                     READY   891
C      CALL GEDLAB(8HREADY 10,IUMEMN,NAME,IFMEMN,LROW,LCOL)            READY   892
C                                                                      READY   893
C      KOUNT=LINES                                                     READY   894
C      LYNE=0                                                          READY   895
C      WST=0.0                                                         READY   896
C      JUMP=0                                                          READY   897
C                                                                      READY   898
C      DO 460 I=1,LROW                                                 READY   899
C      CALL GETROW(IUMEMN,1,BUFFER,LCOL)                               READY   900
C      WST=WST+(BUFFER(IWPUT)*(BUFFER(IT)-BUFFER(IINITT)))             READY   901
C      IF(LYNE.EQ.KROW) GO TO 460                                      READY   902
C      IF(JUMP.EQ.1) GO TO 435                                         READY   903
C      CALL GETROW(IUDESI,1,ROE,KCOL)                                  READY   904
C      ROE(JOLDT)=ROE(JNEWT)                                           READY   905
C 435  CONTINUE                                                        READY   906
C      IF(IBUF.NE.IROE) GO TO 445                                      READY   907
C      JUMP=0                                                          READY   908
C      ROE(JNEWT)=BUFFER(IT)                                           READY   909
C      IF(KLUNAL.EQ.0) GO TO 440                                       READY   910
C      SRMIN=BUFFER(ISRAT)*BUFFER(IT)                                  READY   911
C      SZMIN=BUFFER(IMINTO)                                            READY   912
C      IF(SRMIN.GT.SZMIN) ROE(JMINT)=SRMIN                             READY   913
```

```
     9    ,STRFI(I,3),STRFN(I,3),DSTFZ
     A    ,STRFI(I,4),STRFN(I,4),DSTFXX
     B    ,STRFI(I,5),STRFN(I,5),DSTFYY
     C    ,STRFI(I,6),STRFN(I,6),DSTFZZ
  398 CONTINUE
 9051 FORMAT(//10X,7HNUMBER=,I5//10X,13H YNAMIC DOF = ,6I5//)
 9052 FORMAT(10X,10X, 15HINITIAL VALUE  ,5X,
     1                15HCURRENT VALUE  ,5X,
     2                15HDELTA VALUE    ,/)
 9053 FORMAT(10X,10H  WEIGHT...,3(E15.5,5X),
     1     /,10X,10H    IXX ...,3(E15.5,5X),
     2     /,10X,10H    IYY ...,3(E15.5,5X),
     3        /,10X,10H    IZZ ...,3(E15.5,5X),
     4        /,10X,10H     RX ...,3(E15.5,5X),
     5        /,10X,10H     RY ...,3(E15.5,5X),
     6    /,10X,10H     RZ ...,3(E15.5,5X),
     7    /,10X,10H    PFX ...,3(E15.5,5X),
     8    /,10X,10H    PFY ...,3(E15.5,5X),
     9    /,10X,10H    PFZ ...,3(E15.5,5X),
     A   /,10X,10H   PFXX ...,3(E15.5,5X),
     B   /,10X,10H   PFYY ...,3(E15.5,5X),
     C   /,10X,10H   PFZZ ...,3(E15.5,5X),///)
C
      CALL INCONS
      GO TO 701
C
  400 CONTINUE
C
C  ******************************************************
C  *        THE FOLLOWING LINES OF FASTOP CODE HAVE      *
C  *        BEEN COMMENTED OUT BECAUSE THEY ARE NOT      *
C  *        USED IN THE CURRENT VERSION OF ESP.          *
C  ******************************************************
C
C     IF(NCYC.GT.0) GO TO 700
C
C
C NPASS=1  DO SOME OR ALL OF THE FOLLOWING-DEPENDING ON THE CURRENT
C USE OF THE PROGRAM AND THE MANNER IN WHICH ASOP WAS USED IN THE LAST
C PASS THROUGH THE ANALYSIS PACKAGE.
C
C 1. TRANSFER THE ELEMENT STIFFNESS FILE TO AN OUTPUT UNIT.
C 2. UPDATE THE DESIGN ARRAY TO REFLECT MODIFICATIONS MADE BY ASOP.
C 3. TRANSFER WEIGHT DATA AND MASS BALANCE DATA FROM INPUT TAPE TO CORE.
C
C
C     IF(KLUSE.NE.2) GO TO 430
C
C     IUSTFN=IUDUM3-IUSTFN
C     IUSTFO=IUDUM3-IUSTFO
C     IFSTFN=IFDUM3-IFSTFN
C     IFSTFO=IFDUM3-IFSTFO
C
C     CALL GEDLAB(8HREADY 07,IUSTFO,NAME,IFSTFO,MROW,MCOL)
C     CALL PUDLAB(8HREADY 04,IUSTFN,NAME,IFSTFN,MROW,MCOL)
C
C     DO 430 I=1,NSTMEM
```

```
C     IUA = 14
CIBM
C
CCDC
      IUA = 11
CCDC
C
      IFA = 1
      IF(ISTEP.LT.0) ISTEP=1
      IF(ISTEP.GT.1) ISTEP=0
      ITESTO = 0
      ISTOP = 0
      IPAR = 0
      IDUB = ISTEP
      ITAPEN = ITAPES(40)
      ISAVE = ITAPEW
      ITAPEW = ITAPEN
      CALL TITLES(1)
      ITAPEW = ISAVE
      READ(IUCD,9055) VNEW,STPOLD,VS
      VNSAVE = VNEW
 9055 FORMAT(3E10.3)
      READ(IUCD,9055) STEP1,STEP2,ASTEP
      SAVSTP = STEP2
      RILSTP = ASTEP
      ASTEP = 10.0 * RILSTP
      NUMSTR=I
C
C
      KOUNT=LINES
      CALL TITLES(2)
C
      DO 398 I=1,NUMSTR
      WRITE(IUPR,9051) IDSTR(I),(IDYDOF(I,K),K=1,6)
      WRITE(IUPR,9052)
      DSTW=STRWN(I)-STRWI(I)
      DSTIX=STRIN(I,1)-STRII(I,1)
      DSTIY=STRIN(I,2)-STRII(I,2)
      DSTIZ=STRIN(I,3)-STRII(I,3)
      DSTRX = STRRN(I,1) - STRRI(I,1)
      DSTRY = STRRN(I,2) - STRRI(I,2)
      DSTRZ = STRRN(I,3) - STRRI(I,3)
      DSTFX = STRFN(I,1) - STRFI(I,1)
      DSTFY = STRFN(I,2) - STRFI(I,2)
      DSTFZ = STRFN(I,3) - STRFI(I,3)
      DSTFXX = STRFN(I,4) - STRFI(I,4)
      DSTFYY = STRFN(I,5) - STRFI(I,5)
      DSTFZZ = STRFN(I,6) - STRFI(I,6)
      WRITE(IUPR,9053) STRWI(I),STRWN(I),DSTW,
     1                 STRII(I,1),STRIN(I,1),DSTIX,
     2                 STRII(I,2),STRIN(I,2),DSTIY,
     3                  STRII(I,3),STRIN(I,3),DSTIZ,
     4                  STRRI(I,1),STRRN(I,1),DSTRX,
     5                  STRRI(I,2),STRRN(I,2),DSTRY,
     6                  STRRI(I,3),STRRN(I,3),DSTRZ
     7    ,STRFI(I,1),STRFN(I,1),DSTFX
     8     STRFI(I,2),STRFN(I,2),DSTFY
```

```
            READ(IUCD,9054) E, F, G, T                                    READY     686
       9054 FORMAT(E15.5,/,3E15.5,/,3E15.5,/,6E10.3)                      READY     687
            SCALE(N,1) = E                                                READY     688
            DO 386 NN= 1,3                                                READY     689
            SCALE(N,NN+1)= F(NN)                                          READY     690
            SCALE(N,NN+4)= G(NN)                                          READY     691
        386 CONTINUE                                                      READY     692
       9056 FORMAT(3E15.5)                                                READY     693
       9050 FORMAT(E15.5,/,3E15.5,/,3E15.5,/,6E10.3,/,6I5,/,6I5)          READY     694
            DO 387 NN = 1, 6                                              READY     695
            SCALE(N,NN+7) = T(NN)                                         READY     696
        387 CONTINUE                                                      READY     697
            I=I+1                                                         READY     698
            IDSTR(I)=N                                                    READY     699
            STRWI(I)=A                                                    READY     700
            STRWO(I)=A                                                    READY     701
            STRWN(I)=A                                                    READY     702
            STRWDO(I)=0.0                                                 READY     703
            STRWDN(I)=0.0                                                 READY     704
      C                                                                   READY     705
            DO 391 K=1,3                                                  READY     706
            STRII(I,K)=B(K)                                               READY     707
            STRIO(I,K)=B(K)                                               READY     708
            STRIN(I,K)=B(K)                                               READY     709
            STRIDO(I,K)=0.0                                               READY     710
            STRIDN(I,K)=0.0                                               READY     711
            STRRI(I,K) = C(K)                                             READY     712
            STRRO(I,K) = C(K)                                             READY     713
            STRRN(I,K) = C(K)                                             READY     714
            STRRDO(I,K)= 0.                                               READY     715
            STRRDN(I,K)= 0.                                               READY     716
        391 CONTINUE                                                      READY     717
      C                                                                   READY     718
            DO 392 K=1,6                                                  READY     719
            ISTDOF(I,K)=IJS(K)                                            READY     720
            IDYDOF(I,K)=IJD(K)                                            READY     721
            STRFI(I,K) = S(K)                                             READY     722
            STRFO(I,K) = S(K)                                             READY     723
            STRFN(I,K) = S(K)                                             READY     724
            STRFDO(I,K) = 0.0                                             READY     725
            STRFDN(I,K) = 0.0                                             READY     726
        392 CONTINUE                                                      READY     727
            GO TO 390                                                     READY     728
        395 CONTINUE                                                      READY     729
            READ(IUCD,9000) ISTEP,KCONST,ISIZE                            READY     730
      C                                                                   READY     731
      C     TRANSFER DYNAMIC FLEXIBILITY MATRIX( DSM ) TO DSIO            READY     732
      C     UNIT 14.  INVERT DSM AND PLACE ON FILE 2 OF UNIT 8.           READY     733
      C                                                                   READY     734
      CIBM                                                                READY     735
      C     CALL DINIT(14,8HFT14F001)                                     READY     736
      C     CALL DINIT(15,8HFT15F001)                                     READY     737
      CIBM                                                                READY     738
      C                                                                   READY     739
            CALL DYNSTF                                                   READY     740
      C                                                                   READY     741
      CIBM                                                                READY     742
```

```
C                                                                  READY
C     *******************************************************     READY
C     *       THE FOLLOWING LINES OF FASTOP CODE HAVE       *     READY
C     *       BEEN COMMENTED OUT BECAUSE THEY ARE NOT       *     READY
C     *       USED IN THE CURRENT VERSION OF ESP.           *     READY
C     *******************************************************     READY
C                                                                  READY
C       IF(KLUBAL.EQ.O) GO TO 385                                  READY
C       I=O                                                        READY
C 365 READ(IUCD,9003) I1,A1,(J1(K),K=1,3)                          READY
C       IF(I1.EQ.O) GO TO 375                                      READY
C       I=I+1                                                      READY
C       IDBAL(I)=I1                                                READY
C       VMBIN(I)=A1                                                READY
C       VMBOLD(I)=A1                                               READY
C       VMBNEW(I)=A1                                               READY
C       DO 370 K=1,3                                               READY
C 370 MBDOF(I,K)=J1(K)                                             READY
C       DRVMB(I)=0.0                                               READY
C       DRVMBO(I)=0.0                                              READY
C       S1MB(I)=0.0                                                READY
C       S2MB(I)=0.0                                                READY
C       S3MB(I)=0.0                                                READY
C       GO TO 365                                                  READY
C 375 NMBAL=I                                                      READY
C                                                                  READY
C       KOUNT=LINES                                                READY
C       CALL TITLES(2)                                             READY
C       WRITE(IUPR,9014)                                           READY
C       KOUNT=KOUNT+5                                              READY
C       DO 380 LL=1,NMBAL                                          READY
C       WMB=WMB+VMBNEW(LL)                                         READY
C       WRITE(IUPR,9015) IDBAL(LL),VMBIN(LL),(MBDOF(LL,MM),MM=1,3) READY
C       KOUNT=KOUNT+2                                              READY
C 380 CONTINUE                                                     READY
C                                                                  READY
C       WRITE(IUPR,9016) WMB                                       READY
C       KOUNT=KOUNT+2                                              READY
C                                                                  READY
C 385 CONTINUE                                                     READY
C                                                                  READY
C     *******************************************************     READY
C     *       END OF CODE THAT HAS BEEN COMMENTED OUT.      *     READY
C     *******************************************************     READY
C                                                                  READY
        WBOTH=WMB+WST                                              READY
C                                                                  READY
        IF (KLUSE.LE.O)  GO TO 400                                 READY
C                                                                  READY
        NUMSTR=O                                                   READY
        I=O                                                        READY
  390 CONTINUE                                                     READY
        READ(IUCD,9000) N                                          READY
        IF(N.EQ.O) GO TO 395                                       READY
        IFLEX = 29                                                 READY
        IPREV = O                                                  READY
        READ(IUCD.9050) A. B. C. S. IJS. IJD                       READY
```

```
      C                                                                    READY   572
      C     IROE=IBUF                                                      READY   573
      C     ROE(JWPUT)=WT                                                  READY   574
      C     ROE(JINITT)=BUFFER(IT)                                         READY   575
      C     SRMIN=BUFFER(ISRAT)*BUFFER(IT)                                 READY   576
      C     SZMIN=BUFFER(IMINTO)                                           READY   577
      C     IF(SRMIN.GT.SZMIN) ROE(JMINT)=SRMIN                            READY   578
      C     IF(SRMIN.LE.SZMIN) ROE(JMINT)=-SZMIN                           READY   579
      C     ROE(JMAXT)=BUFFER(IMAXT)                                       READY   580
      C     ROE(JOLDT)=0.0                                                 READY   581
      C     ROE(JNEWT)=BUFFER(IT)                                          READY   582
      C     ROE(JDRV)=0.0                                                  READY   583
      C     ROE(JDRVO)=0.0                                                 READY   584
      C     ROE(JSPR1)=0.0                                                 READY   585
      C     ROE(JSPR2)=0.0                                                 READY   586
      C     ROE(JSPR3)=0.0                                                 READY   587
      C     CALL PUTROW(IUDESN,2,ROE,NVAR)                                 READY   588
      C                                                                    READY   589
      C     CALL TITLES(2)                                                 READY   590
      C     IF(KOUNT.GT.KOUNTH) GO TO 310                                  READY   591
      C     WRITE(IUPR,9012)                                               READY   592
      C     KOUNT=KOUNT+5                                                  READY   593
      C     L=0                                                            READY   594
      C 310 CONTINUE                                                       READY   595
      C     AMINT=ABS(ROE(JMINT))                                          READY   596
      C     WRITE(IUPR,9013) IROE,ROE(JNEWT),ROE(JOLDT),ROE(JINITT),       READY   597
      C    1                                AMINT,ROE(JMAXT),ROE(JWPUT),IROE READY 598
      C     KOUNT=KOUNT+1                                                  READY   599
      C     L=L+1                                                          READY   600
      C     IF(L.LT.4) GO TO 320                                           READY   601
      C     L=0                                                            READY   602
      C     IF(KOUNT.EQ.LINES) GO TO 320                                   READY   603
      C     CALL PLB(1,1,IUPR)                                             READY   604
      C     KOUNT=KOUNT+1                                                  READY   605
      C                                                                    READY   606
      C 320 CONTINUE                                                       READY   607
      C     CALL PUTROW(IUMEMN,1,BUFFER,KCOL)                              READY   608
      C                                                                    READY   609
      C 350 CONTINUE                                                       READY   610
      C                                                                    READY   611
      C                                                                    READY   612
      C     CALL DCLOSE(IUMEMO)                                            READY   613
      C     CALL DCLOSE(IUMEMN)                                            READY   614
      C                                                                    READY   615
      C     CALL DCLOSE(IUDESN)                                            READY   616
      C     CALL DCLOSE(IUSTFN)                                            READY   617
      C                                                                    READY   618
      C  ******************************************************           READY   619
      C  *       END OF CODE THAT HAS BEEN COMMENTED OUT.      *           READY   620
      C  ******************************************************           READY   621
      C                                                                    READY   622
        360 CONTINUE                                                       READY   623
      C                                                                    READY   624
            WST=0.0                                                        READY   625
            WMB=0.0                                                        READY   626
      C                                                                    READY   627
```

```
      IPOS(IUMEMO)=IFMEMO
      IPOS(IUMEMN)=IFMEMN
C
C ****************************************************
C *        THE FOLLOWING LINE OF FASTOP CODE HAS      *
C *        BEEN COMMENTED OUT BECAUSE IT IS NOT       *
C *        USED IN THE CURRENT VERSION OF ESP.        *
C ****************************************************
C     CALL GEDLAB(8HREADY O6,IUMEMO,NAME,IFMEMO,KROW,KCOL)
C
C ****************************************************
C *        THE FOLLOWING TWO LINES OF FASTOP CODE     *
C *        HAVE BEEN MODIFIED FOR THE CURRENT         *
C *        VERSION OF ESP.                            *
C ****************************************************
C     CALL PUDLAB(8HREADY O2,IUMEMN,NAME,IFMEMN,KROW,KCOL)
C     NDESYS=NSTMEM-NDESNO
      CALL PUDLAB (8HREADY O2,IUMEMN,NAME,IFMEMN,O,KCOL)
      NDESYS = O
      CALL PUDLAB(8HREADY O3,IUDESN,NAM1,IFDESN,NDESYS,NVAR)
      CALL DCLOSE (IUMEMN)
      CALL DCLOSE (IUDESN)
C
C ****************************************************
C *        THE FOLLOWING LINES OF FASTOP CODE HAVE    *
C *        BEEN COMMENTED OUT BECAUSE THEY ARE NOT    *
C *        USED IN THE CURRENT VERSION OF ESP.        *
C ****************************************************
C
C     KOUNT=LINES
C
C     DO 350 I=1,KROW
C     CALL GETROW(IUMEMO,1,BUFFER,KCOL)
C     BUFFER(IMINTO)=BUFFER(IMINT)
C     BUFFER(IINITT)=BUFFER(IT)
C     BUFFER(IWPUT)=WT
C
C     IF(IDNOPT.NE.1) GO TO 300
C
C     IF(I.GT.KMAX) GO TO 240
C     IF(IBUF.NE.JCHART(1,I)) GO TO 240
C     J=I
C     GO TO 260
C
C 240 CONTINUE
C     DO 250 K=1,KMAX
C     IF(IBUF.NE.JCHART(1,K)) GO TO 250
C     J=K
C     GO TO 260
C 250 CONTINUE
C     GO TO 300
C
C 260 CONTINUE
C
C     IF(JCHART(2,J).EQ.1) GO TO 320
C
C 300 CONTINUE
```

```
C      IF(AA.NE.O .AND.AA.NE.1.) WT=WT*AA
C      CHART(4,J)=GOOD
C
C  180 CALL PRITE(IUSTFN,PATTY(1),24)
C      NBYTE=4*NODES
C      CALL PREAD(IUSTFO,NSTART(1),NBYTE)
C      CALL PRITE(IUSTFN,NSTART(1),NBYTE)
C      CALL PREAD(IUSTFO,NGO(1),NBYTE)
C      CALL PRITE(IUSTFN,NGO(1),NBYTE)
C      NBYTE=NBYTES*IROW
C      DO 190 J=1,ICOL
C      CALL PREAD(IUSTFO,ELSTF(1,J),NBYTE)
C  190 CALL PRITE(IUSTFN,ELSTF(1,J),NBYTE)
C      CALL REND(IUSTFO)
C      CALL WEND(IUSTFN)
C
C  200 CONTINUE
C
C      CALL DCLOSE(IUSTFO)
C      CALL DCLOSE(IUSTFN)
C
C      IF(IDNOPT.NE.1) GO TO 215
C      NUMBAD=0
C      DO 210 K=1,KMAX
C      IF(CHART(4,K).EQ.GOOD) GO TO 210
C      IF(NUMBAD.EQ.0) KOUNT=LINES
C      CALL TITLES(2)
C      IF(KOUNT.GT.KOUNTH) GO TO 205
C      WRITE(IUPR,9024)
C      KOUNT=KOUNT+3
C  205 CONTINUE
C      NUMBAD=NUMBAD+1
C      WRITE(IUPR,9013) JCHART(1,K)
C      KOUNT=KOUNT+1
C  210 CONTINUE
C      IF(NBAD.EQ.0.AND.NUMBAD.EQ.0) GO TO 215
C      KOUNT=LINES
C      CALL TITLES(2)
C      WRITE(IUPR,9025)
C      STOP
C
C  215 CONTINUE
C
C  220 CONTINUE
C
C    ***************************************************
C    *       END OF CODE THAT HAS BEEN COMMENTED OUT.      *
C    ***************************************************
C
       IF(KLUSE.NE.2) GO TO 360
C
C
C
       IUMEMN=IUDUM1-IUMEMN
       IUMEMO=IUDUM1-IUMEMO
       IFMEMN=IFDUM1-IFMEMN
       IFMEMO=IFDUM1-IFMEMO
```

```
VARIABLES      SN  TYPE          RELOCATION
71377  G           REAL      ARRAY             REFS        18      690  DEFINED      685
 2021  I           INTEGER                     REFS       297      697      698      699      700      701      702
                                                703       706      707      708      709      710      711      712
                                                713       714      715      719      720      721      722      723
                                                724       725      768    2*775    2*777    2*778    2*779    2*780
                                              2*781     2*782    2*783    2*784    2*785    2*786    2*787    2*788
                                              2*789    26*790   2*1030   2*1032   2*1033   2*1034   2*1035   2*1036
                                             2*1037    2*1038   2*1039   2*1040   2*1041   2*1042   2*1043   2*1044
                                            26*1045   DEFINED      294      678      697      774     1029
   22  IBAND       INTEGER           KLUES     REFS        70  DEFINED      158
 2071  IBUF        INTEGER                     REFS        24
    0  ICYCLE      INTEGER           STRCLU    REFS        35       86
    1  IDBAL       INTEGER   ARRAY   BAL       REFS        37
    3  IDENS       INTEGER           COLS      REFS        48  DEFINED      135
71323  IDJ         INTEGER  *UNDEF             REFS        12
    7  IDNOPT      INTEGER           KLUES     REFS        70
   76  IDSTR       INTEGER   ARRAY   STORES    REFS        79      775     1030  DEFINED      698
   53  IDUB        INTEGER           RESIZE    REFS        89  DEFINED      755
   40  IDYDOF      INTEGER   ARRAY   STORES    REFS        79      775     1030  DEFINED      720
 2014  IDYFLX      INTEGER                     REFS     2*290      292      295      297    2*299    2*304     1101
                                            DEFINED       216
 2051  IERR     *  INTEGER                     REFS      1101
   21  IFA         INTEGER           PLACES    REFS        53  DEFINED      749
   67  IFADD       INTEGER           PLACES    REFS        53
   41  IFADDI      INTEGER           PLACES    REFS        53
   33  IFB         INTEGER           PLACES    REFS        53
   71  IFBAL       INTEGER           PLACES    REFS        53
   43  IFBALI      INTEGER           PLACES    REFS        53
  117  IFBR        INTEGER           PLACES    REFS        53
   53  IFBT        INTEGER           PLACES    REFS        53
   73  IFDESF      INTEGER           PLACES    REFS        53
   45  IFDESI      INTEGER           PLACES    REFS        53
   55  IFDESN      INTEGER           PLACES    REFS        53      533
   35  IFDESO      INTEGER           PLACES    REFS        53
   77  IFDUM1      INTEGER           PLACES    REFS        53      512      513
  101  IFDUM2      INTEGER           PLACES    REFS        53
  103  IFDUM3      INTEGER           PLACES    REFS        53
   23  IFIN        INTEGER           KLUES     REFS        70  DEFINED      159
  141  IFINCK      INTEGER           PLACES    REFS        53
  137  IFINCM      INTEGER           PLACES    REFS        53
   31  IFKS        INTEGER           PLACES    REFS        53
  105  IFL         INTEGER           PLACES    REFS        53
    2  IFLEX       INTEGER           INVERT    REFS        94  DEFINED      682
 2013  IFLEXI      INTEGER                     REFS       290      299      304  DEFINED      131
                                            I/O REFS      288      295
 2012  IFLEXS      INTEGER                     REFS       289      301      303  DEFINED      129
  115  IFLR        INTEGER           PLACES    REFS        53
   57  IFMD        INTEGER           PLACES    REFS        53
   65  IFMDB       INTEGER           PLACES    REFS        53
   37  IFMDBI      INTEGER           PLACES    REFS        53
   61  IFMEMF      INTEGER           PLACES    REFS        53
   25  IFMEMN      INTEGER           PLACES    REFS        53      512      515      531  DEFINED      512
   51  IFMEMO      INTEGER           PLACES    REFS        53      513      514  DEFINED      513
    5  IFMOD       INTEGER           LOCSTR    REFS        87
  125  IFMODK      INTEGER           PLACES    REFS        53
  123  IFMODM      INTEGER           PLACES    REFS        53
    3  IFMREF      INTEGER           LOCSTR    REFS        87
```

```
VARIABLES     SN  TYPE              RELOCATION
   135  IFPH      INTEGER                PLACES      REFS       53
   127  IFPHT     INTEGER                PLACES      REFS       53
   121  IFPHIF    INTEGER                PLACES      REFS       53
   133  IFQ       INTEGER                PLACES      REFS       53
   131  IFQT      INTEGER                PLACES      REFS       53
    11  IFSCR     INTEGER                PLACES      REFS       53
    27  IFSTFN    INTEGER                PLACES      REFS       53
    63  IFSTFO    INTEGER                PLACES      REFS       53
     1  IFSTRI    INTEGER                LOCSTR      REFS       87
    12  IFS1      INTEGER                PLACES      REFS       53
    13  IFS2      INTEGER                PLACES      REFS       53
    14  IFS3      INTEGER                PLACES      REFS       53
    15  IFS4      INTEGER                PLACES      REFS       53
    75  IFWT      INTEGER                PLACES      REFS       53
    47  IFWTI     INTEGER                PLACES      REFS       53
    23  IFY       INTEGER                PLACES      REFS       53
   107  IFYT      INTEGER                PLACES      REFS       53
   111  IFZ       INTEGER                PLACES      REFS       53
   113  IFZR      INTEGER                PLACES      REFS       53
    10  IINITT    INTEGER                COLS        REFS       48   DEFINED      140
 71416  IJD       INTEGER    ARRAY                   REFS       19       720  DEFINED      684
 71410  IJS       INTEGER    ARRAY                   REFS       19       719  DEFINED      684
  2015  IMASS     INTEGER                            REFS     1101   DEFINED      216
     2  IMAXT     INTEGER                COLS        REFS       48   DEFINED      134
     1  IMINT     INTEGER                COLS        REFS       48   DEFINED      133
     7  IMINTO    INTEGER                COLS        REFS       48   DEFINED      139
     0  INVERT    INTEGER                INVERT      REFS       94
     4  IOLDT     INTEGER                COLS        REFS       48   DEFINED      136
     5  IOLDW     INTEGER                COLS        REFS       48   DEFINED      137
     1  IPAR      INTEGER                ACCEL       REFS       90   DEFINED      754
    41  IPERM     INTEGER    ARRAY       INVERT      REFS       94
     0  IPOS      INTEGER    ARRAY       FILE        REFS       16        75  DEFINED      514       515
   173  IPREV     INTEGER                INVERT      REFS       94   DEFINED      683
     2  IRED      INTEGER                KLUES       REFS       70       171      175
  2052  IROE      INTEGER   *UNDEF                   REFS       24
  2030  ISAVE     INTEGER                            REFS      760   DEFINED      757
     0  ISIZE     INTEGER                RESIZE      REFS       89   DEFINED      729
     6  ISRAT     INTEGER                COLS        REFS       48   DEFINED      138
     2  ISTDOF    INTEGER    ARRAY       STORES      REFS       79   DEFINED      719
     1  ISTEP     INTEGER                STRCLU      REFS       86       750      751       755   DEFINED       729       750
                                                      751
     0  ISTOP     INTEGER                ACCEL       REFS       90   DEFINED      753
     0  IT        INTEGER                COLS        REFS       48   DEFINED      132
  2027  ITAPEN    INTEGER                            REFS      758   DEFINED      756
     2  ITAPEP    INTEGER                COMRWP      REFS       92
     0  ITAPER    INTEGER                COMRWP      REFS       92
     0  ITAPES    INTEGER    ARRAY       CTAPES      REFS       93       756
     1  ITAPEW    INTEGER                COMRWP      REFS       92       757  DEFINED      758       760
    51  ITESTO    INTEGER                RESIZE      REFS       89   DEFINED      752
  2016  ITRNSF    INTEGER                            REFS     1101   DEFINED      216
    20  IUA       INTEGER                PLACES      REFS       53      1066  DEFINED      746
    66  IUADD     INTEGER                PLACES      REFS       53
    40  IUADDI    INTEGER                PLACES      REFS       53
     1  IUA2      INTEGER                INVERT      REFS       94
    32  IUB       INTEGER                PLACES      REFS       53
    70  IUBAL     INTEGER                PLACES      REFS       53
    42  IUBALI    INTEGER                PLACES      REFS       53
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VARIABLES      SN  TYPE          RELOCATION
  116  IUBR        INTEGER            PLACES      REFS         53
   52  IUBT        INTEGER            PLACES      REFS         53
   16  IUCD        INTEGER            PLACES      REFS         53    I/O REFS     216      680      684      685      729
                                                   761        764
   72  IUDESF      INTEGER            PLACES      REFS         53
   44  IUDESI      INTEGER            PLACES      REFS         53
   54  IUDESN      INTEGER            PLACES      REFS         53      533      535
   34  IUDESO      INTEGER            PLACES      REFS         53
   76  IUDUM1      INTEGER            PLACES      REFS         53      510      511
  100  IUDUM2      INTEGER            PLACES      REFS         53
  102  IUDUM3      INTEGER            PLACES      REFS         53
    4  IUGO1       INTEGER            PLACES      REFS         53
    5  IUGO2       INTEGER            PLACES      REFS         53
    6  IUGO3       INTEGER            PLACES      REFS         53
    7  IUGO4       INTEGER            PLACES      REFS         53
  140  IUINCK      INTEGER            PLACES      REFS         53
  136  IUINCM      INTEGER            PLACES      REFS         53
    0  IUIN1       INTEGER            PLACES      REFS         53
    1  IUIN2       INTEGER            PLACES      REFS         53
   30  IUKS        INTEGER            PLACES      REFS         53
  104  IUL         INTEGER            PLACES      REFS         53
  114  IULR        INTEGER            PLACES      REFS         53
   56  IUMD        INTEGER            PLACES      REFS         53
   64  IUMDB       INTEGER            PLACES      REFS         53
   36  IUMDBI      INTEGER            PLACES      REFS         53
   60  IUMEMF      INTEGER            PLACES      REFS         53
   24  IUMEMN      INTEGER            PLACES      REFS         53      510      515      531      534
                                                 DEFINED      510
   50  IUMEMO      INTEGER            PLACES      REFS         53      511      514   DEFINED     511
    4  IUMOD       INTEGER            LOCSTR      REFS         87
  124  IUMODK      INTEGER            PLACES      REFS         53
  122  IUMODM      INTEGER            PLACES      REFS         53
    2  IUMREF      INTEGER            LOCSTR      REFS         87
    2  IUOUT1      INTEGER            PLACES      REFS         53
    3  IUOUT2      INTEGER            PLACES      REFS         53
  134  IUPH        INTEGER            PLACES      REFS         53
  126  IUPHT       INTEGER            PLACES      REFS         53
  120  IUPHTF      INTEGER            PLACES      REFS         53
   17  IUPR        INTEGER            PLACES      REFS         53     1066   I/O REFS    775      776      790     1030
                                                  1031       1045
  132  IUQ         INTEGER            PLACES      REFS         53
  130  IUQI        INTEGER            PLACES      REFS         53
   10  IUSCR       INTEGER            PLACES      REFS         53
   26  IUSTFN      INTEGER            PLACES      REFS         53
   62  IUSTFO      INTEGER            PLACES      REFS         53
    0  IUSTRI      INTEGER            LOCSTR      REFS         87
   74  IUWT        INTEGER            PLACES      REFS         53
   46  IUWTI       INTEGER            PLACES      REFS         53
   22  IUY         INTEGER            PLACES      REFS         53
  106  IUYT        INTEGER            PLACES      REFS         53
  110  IUZ         INTEGER            PLACES      REFS         53
  112  IUZR        INTEGER            PLACES      REFS         53
 2557  IWORK       INTEGER                        REFS         24
   11  IWPUT       INTEGER            COLS        REFS         48   DEFINED     141
 2557  JCHART      INTEGER     ARRAY              REFS         12      24
   21  JDRV        INTEGER            COLS        REFS         48   DEFINED     150
   22  JDRVO       INTEGER            COLS        REFS         48   DEFINED     151
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VARIABLES      SN  TYPE          RELOCATION
     14  JINITT     INTEGER            COLS        REFS       48   DEFINED     145
     16  JMAXT      INTEGER            COLS        REFS       48   DEFINED     147
     15  JMINT      INTEGER            COLS        REFS       48   DEFINED     146
     20  JNEWT      INTEGER            COLS        REFS       48   DEFINED     149
     17  JOLDT      INTEGER            COLS        REFS       48   DEFINED     148
     23  JSPR1      INTEGER            COLS        REFS       48   DEFINED     152
     24  JSPR2      INTEGER            COLS        REFS       48   DEFINED     153
     25  JSPR3      INTEGER            COLS        REFS       48   DEFINED     154
     13  JWPUT      INTEGER            COLS        REFS       48   DEFINED     144
  71371  J1         INTEGER   *UNDEF               REFS       17
   2022  K          INTEGER                        REFS      295      297   2*706   2*707   2*708     709     710
                                                  2*711   2*712    2*713     714     715   2*719   2*720   2*721
                                                  2*722   2*723      724     725     775    1030
                                                DEFINED      295      297     705     718     775    1030
      7  KBPAGE     INTEGER            CLIST       REFS       77
   2017  KCOL       INTEGER                        REFS      289      292     295     297     301     531
                                                DEFINED      286
      1  KCONST     INTEGER            STORES      REFS       79   DEFINED     729
      4  KLABEL     INTEGER            CLIST       REFS       77
     24  KLUB       INTEGER            KLUES       REFS       70   DEFINED     161     171     172
      4  KLUBAL     INTEGER            KLUES       REFS       70
      1  KLUEV      INTEGER   ARRAY    CLUEV       REFS       97      292     297
      3  KLUMD      INTEGER            KLUES       REFS       70      172
      1  KLUNAL     INTEGER            KLUES       REFS       70
     25  KLUQ       INTEGER            KLUES       REFS       70   DEFINED     174     175
      0  KLUSE      INTEGER            KLUES       REFS       70      159     172     175     506     675    1027
      0  KORE       INTEGER            CORE        REFS       76      104     107    1101 DEFINED     103
      1  KOREDP     INTEGER            CORE        REFS       76   DEFINED     104     107
      0  KOUNT      INTEGER            CLIST       REFS       77   DEFINED     112     771
     11  KOUNTH     INTEGER            CLIST       REFS       77
     12  KOUNTI     INTEGER            CLIST       REFS       77
      1  KPAGE      INTEGER            CLIST       REFS       77
   2020  KROW       INTEGER                        REFS      289      292     294 DEFINED     287
      0  KSTOR      INTEGER   ARRAY    STRCLU      REFS       18       35
      5  KTPAGE     INTEGER            CLIST       REFS       77
      2  LINES      INTEGER            CLIST       REFS       77      112     771
     10  LINESG     INTEGER            CLIST       REFS       77
      3  LINEST     INTEGER            CLIST       REFS       77
      0  LKLUEV     INTEGER            CLUEV       REFS       97
      0  MB         INTEGER   ARRAY    BAL         REFS       17       24
    121  MBDOF      INTEGER   ARRAY    BAL         REFS       37
     26  MORBAL     INTEGER            KLUES       REFS       70
      5  MSADD      INTEGER            KLUES       REFS       70
      0  MSTOR      INTEGER   ARRAY    STORES      REFS       18       35
  71317  MUMJ       INTEGER   *UNDEF               REFS       12
      2  M1         INTEGER            STRCLU      REFS       86
      3  M2         INTEGER            STRCLU      REFS       86
      4  M3         INTEGER            STRCLU      REFS       86
      5  M4         INTEGER            STRCLU      REFS       86
   2023  N          INTEGER                        REFS      681      687     689     690     695     698
                                                DEFINED      680
  71357  NAME       INTEGER   ARRAY                REFS       15      531 DEFINED      99
  71440  NAMFLX     INTEGER   ARRAY                REFS       21      289 DEFINED     101
  71361  NAM1       INTEGER   ARRAY                REFS       15      533 DEFINED     100
  71363  NAM2       INTEGER   *UNDEF               REFS       15
  71365  NAM3       INTEGER   *UNDEF               REFS       15
  71367  NAM4       INTEGER   *UNDEF               REFS       15
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VARIABLES      SN  TYPE             RELOCATION
    13  NBAR       INTEGER               KLUES       REFS       70
     0  NBYTES     INTEGER               CBYTES      REFS       74
    20  NCYC       INTEGER               KLUES       REFS       70     156      311     1066   DEFINED     157
     4  NDESNO     INTEGER               SIZES       REFS       52
     5  NDESYS     INTEGER               SIZES       REFS       52     533  DEFINED      532
   174  NDOFT      INTEGER               INVERT      REFS       94
     2  NDYDOF     INTEGER               SIZES       REFS       52     286      287    2*290     2*299     2*304
                                                  DEFINED      216
    14  NFIX       INTEGER               KLUES       REFS       70
     0  NMBAL      INTEGER               BAL         REFS       24      37  DEFINED      627
  2026  NN         INTEGER                           REFS    2*689   2*690    2*695  DEFINED       688       694
    21  NNN        INTEGER               KLUES       REFS       70
     3  NNOPT      INTEGER               SIZES       REFS       52
     6  NPAGE      INTEGER               CLIST       REFS       77
     6  NPASS      INTEGER               KLUES       REFS       70     172      310
     1  NSTDOF     INTEGER               SIZES       REFS       52
     0  NSTMEM     INTEGER               SIZES       REFS       52
    77  NSTOR      INTEGER     ARRAY     INVERT      REFS       94
 71333  NUMB       INTEGER    *UNDEF                 REFS       13
     0  NUMSTR     INTEGER               STORES      REFS       35      79      774     1029   DEFINED       677       768
    12  NVAR       INTEGER               COLS        REFS       48     533  DEFINED      143
    52  RILSTP     REAL                  ACCEL       REFS       90     767  DEFINED      766
  2052  ROE        REAL       *UNDEF                 REFS       14      24
 71424  S          REAL        ARRAY                 REFS       20     721      722      723   DEFINED       684
    52  SAVSTP     REAL                  RESIZE      REFS       89 DEFINED      765
   362  SCALE      REAL        ARRAY     STORES      REFS       79 DEFINED      687      689       690       695
     1  SCLNEW     REAL        ARRAY     RESIZE      REFS       89
    25  SCLOLD     REAL        ARRAY     RESIZE      REFS       89
  2031  STEP1    * REAL                           DEFINED      764
  2032  STEP2      REAL                              REFS      765 DEFINED      764
    11  STPOLD     REAL                  STRCLU      REFS       86 DEFINED      761
   653  STRFDN     REAL        ARRAY     STORES      REFS       79 DEFINED      725
   615  STRFDO     REAL        ARRAY     STORES      REFS       79 DEFINED      724
   463  STRFI      REAL        ARRAY     STORES      REFS       79     784      785      786       787       788       789
                                                    6*790     1039    1040     1041     1042      1043      1044    6*1045
                                                  DEFINED      721
   557  STRFN      REAL        ARRAY     STORES      REFS       79     784      785      786       787       788       789
                                                    6*790     1039    1040     1041     1042      1043      1044    6*1045
                                                  DEFINED      723
   521  STRFO      REAL        ARRAY     STORES      REFS       79 DEFINED      722
   305  STRIDN     REAL        ARRAY     STORES      REFS       79 DEFINED      710
   266  STRIDO     REAL        ARRAY     STORES      REFS       79 DEFINED      709
   122  STRII      REAL        ARRAY     STORES      REFS       79     778      779      780     3*790      1033      1034
                                                     1035   3*1045 DEFINED      706
   160  STRIN      REAL        ARRAY     STORES      REFS       79     778      779      780     3*790      1033      1034
                                                     1035   3*1045 DEFINED      708
   141  STRIO      REAL        ARRAY     STORES      REFS       79 DEFINED      707
   343  STRRDN     REAL        ARRAY     STORES      REFS       79 DEFINED      715
   324  STRRDO     REAL        ARRAY     STORES      REFS       79 DEFINED      714
   177  STRRI      REAL        ARRAY     STORES      REFS       79     781      782      783     3*790      1036      1037
                                                     1038   3*1045 DEFINED      711
   235  STRRN      REAL        ARRAY     STORES      REFS       79     781      782      783     3*790      1036      1037
                                                     1038   3*1045 DEFINED      713
   216  STRRO      REAL        ARRAY     STORES      REFS       79 DEFINED      712
   261  STRWDN     REAL        ARRAY     STORES      REFS       79 DEFINED      703
   254  STRWDO     REAL        ARRAY     STORES      REFS       79 DEFINED      702
   103  STRWI      REAL        ARRAY     STORES      REFS       79     777      790     1032      1045
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VARIABLES     SN  TYPE             RELOCATION
                                                DEFINED      699
   115  STRWN      REAL        ARRAY    STORES     REFS       79       777       790      1032      1045
                                                DEFINED      701
   110  STRWO      REAL        ARRAY    STORES     REFS       79    DEFINED      700
   265  S1MB       REAL        ARRAY    BAL        REFS       37
   311  S2MB       REAL        ARRAY    BAL        REFS       37
   335  S3MB       REAL        ARRAY    BAL        REFS       37
 71432  T          REAL        ARRAY               REFS       20       695    DEFINED      685
 71345  VALUE      REAL       *UNDEF               REFS       13
    10  VDES       REAL                 KLUES      REFS       70
    25  VMBIN      REAL        ARRAY    BAL        REFS       37
    75  VMBNEW     REAL        ARRAY    BAL        REFS       37
    51  VMBOLD     REAL        ARRAY    BAL        REFS       37
    10  VNEW       REAL                 STRCLU     REFS       86       762    DEFINED      761
     0  VNSAVE     REAL                 VSAVE      REFS       96    DEFINED      762
     7  VOLD       REAL                 STRCLU     REFS       86
     1  VOSAVE     REAL                 VSAVE      REFS       96
     6  VS         REAL                 STRCLU     REFS       86    DEFINED      761
     3  WBOTH      REAL                 WAYTS      REFS       73    DEFINED      673
     0  WINITT     REAL                 WAYTS      REFS       73
     2  WMB        REAL                 WAYTS      REFS       73       673    DEFINED      625
  2557  WORK       REAL        ARRAY               REFS       11        24      1101
     4  WPRES      REAL                 WAYTS      REFS       73
     1  WST        REAL                 WAYTS      REFS       73       673    DEFINED      624

FILE NAMES         MODE
        TAPE6      FMT                    WRITES       292       297
        VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS             TYPE    ARGS        REFERENCES
        DCLOSE                  1           303       534       535
        DYNMAS                  7          1101
        DYNSTF                  0           739
        INCONS                  0           822
        MESAGE                  3           113      1131
        NASTRD                  8           290       299       304
        PROGNA                  2           111       180       423      1103      1129
        PUDLAB                  6           289       531       533
        PUTROW                  4           301
        TIMEB                   2           114      1130
        TITLES                  1           759       772
        UNFIL                   1           179       421      1127
        UPDATE                  3          1066

STATEMENT LABELS            DEF LINE    REFERENCES
     0  92                     302         294
   145  95                     307         156
   176  360                    622         506
     0  386                    691         688
     0  387                    696         694
   203  390                    679         727
     0  391                    716         705
     0  392                    726         718
   304  395                    728         681
     0  398                    803         774
   500  400                    825         310       675
     0  680                   1058        1029
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STATEMENT LABELS                  DEF LINE   REFERENCES
  500  700                          1025        311
  634  701                          1064        823
  636  760                          1100       1027
 1411  9000    FMT                  1134        216        680        729
 1413  9002    FMT   NO REFS        1135
 1416  9003    FMT   NO REFS        1136
 1421  9004    FMT   NO REFS        1137
 1434  9005    FMT   NO REFS        1140
 1437  9006    FMT   NO REFS        1141
 1451  9007    FMT   NO REFS        1144
 1465  9008    FMT   NO REFS        1147
 1467  9009    FMT   NO REFS        1148
 1472  9010    FMT   NO REFS        1149
 1503  9011    FMT   NO REFS        1151
 1513  9012    FMT   NO REFS        1153
 1527  9013    FMT   NO REFS        1161
 1532  9014    FMT   NO REFS        1162
 1542  9015    FMT   NO REFS        1164
 1545  9016    FMT   NO REFS        1165
 1553  9017    FMT   NO REFS        1166
 1560  9018    FMT   NO REFS        1167
 1570  9019    FMT   NO REFS        1169
 1600  9020    FMT   NO REFS        1171
 1604  9021    FMT   NO REFS        1172
 1612  9022    FMT   NO REFS        1173
 1663  9023    FMT   NO REFS        1181
 1715  9024    FMT   NO REFS        1187
 1742  9025    FMT   NO REFS        1192
 1762  9026    FMT                  1196        295
 1765  9027    FMT                  1197        292
 1776  9028    FMT                  1199        297
 1120  9050    FMT                   693        684
 1241  9051    FMT                   804        775       1030
 1247  9052    FMT                   805        776       1031
 1257  9053    FMT                   808        790       1045
 1111  9054    FMT                   686        685
 1144  9055    FMT                   763        761        764
 1116  9056    FMT   NO REFS         692
    0  9999          INACTIVE       1201

LOOPS  LABEL    INDEX      FROM-TO     LENGTH    PROPERTIES
  110  92       I          294  302      30B                EXT REFS
  223  386      NN         688  691       4B      INSTACK
  235  387      NN         694  696       3B      INSTACK
  254  391      K          705  716      11B          OPT
  272  392      K          718  726      10B          OPT
  345  398      I          774  803     131B                EXT REFS  NOT INNER
  353           K          775  775      11B                EXT REFS
  503  680      I         1029 1058     131B                EXT REFS  NOT INNER
  511           K         1030 1030      11B                EXT REFS

COMMON BLOCKS   LENGTH     MEMBERS - BIAS NAME(LENGTH)
      BAL          241              0 NMBAL  (1)              1 IDBAL  (20)             21 VMBIN  (20)
                                   41 VMBOLD (20)            61 VMBNEW (20)             81 MBDOF  (60)
                                  141 DRVMB  (20)           161 DRVMBO (20)            181 S1MB   (20)
                                  201 S2MB   (20)           221 S3MB   (20)
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COMMON BLOCKS    LENGTH     MEMBERS - BIAS NAME(LENGTH)
                                      3 IDENS  (1)              4 IOLDT  (1)              5 IOLDW  (1)
                                      6 ISRAT  (1)              7 IMINTO (1)              8 IINITT (1)
                                      9 IWPUT  (1)             10 NVAR   (1)             11 JWPUT  (1)
                                     12 JINITT (1)             13 JMINT  (1)             14 JMAXT  (1)
                                     15 JOLDT  (1)             16 JNEWT  (1)             17 JDRV   (1)
                                     18 JDRVO  (1)             19 JSPR1  (1)             20 JSPR2  (1)
                                     21 JSPR3  (1)
       SIZES           6              0 NSTMEM (1)              1 NSTDOF (1)              2 NDYDOF (1)
                                      3 NNOPT  (1)              4 NDESNO (1)              5 NDESYS (1)
       PLACES         98              0 IUIN1  (1)              1 IUIN2  (1)              2 IUOUT1 (1)
                                      3 IUOUT2 (1)              4 IUGO1  (1)              5 IUGO2  (1)
                                      6 IUGO3  (1)              7 IUGO4  (1)              8 IUSCR  (1)
                                      9 IFSCR  (1)             10 IFS1   (1)             11 IFS2   (1)
                                     12 IFS3   (1)             13 IFS4   (1)             14 IUCD   (1)
                                     15 IUPR   (1)             16 IUA    (1)             17 IFA    (1)
                                     18 IUY    (1)             19 IFY    (1)             20 IUMEMN (1)
                                     21 IFMEMN (1)             22 IUSTFN (1)             23 IFSTFN (1)
                                     24 IUKS   (1)             25 IFKS   (1)             26 IUB    (1)
                                     27 IFB    (1)             28 IUDESO (1)             29 IFDESO (1)
                                     30 IUMDBI (1)             31 IFMDBI (1)             32 IUADDI (1)
                                     33 IFADDI (1)             34 IUBALI (1)             35 IFBALI (1)
                                     36 IUDESI (1)             37 IFDESI (1)             38 IUWTI  (1)
                                     39 IFWTI  (1)             40 IUMEMO (1)             41 IFMEMO (1)
                                     42 IUBT   (1)             43 IFBT   (1)             44 IUDESN (1)
                                     45 IFDESN (1)             46 IUMD   (1)             47 IFMD   (1)
                                     48 IUMEMF (1)             49 IFMEMF (1)             50 IUSTFO (1)
                                     51 IFSTFO (1)             52 IUMDB  (1)             53 IFMDB  (1)
                                     54 IUADD  (1)             55 IFADD  (1)             56 IUBAL  (1)
                                     57 IFBAL  (1)             58 IUDESF (1)             59 IFDESF (1)
                                     60 IUWT   (1)             61 IFWT   (1)             62 IUDUM1 (1)
                                     63 IFDUM1 (1)             64 IUDUM2 (1)             65 IFDUM2 (1)
                                     66 IUDUM3 (1)             67 IFDUM3 (1)             68 IUL    (1)
                                     69 IFL    (1)             70 IUYT   (1)             71 IFYT   (1)
                                     72 IUZ    (1)             73 IFZ    (1)             74 IUZR   (1)
                                     75 IFZR   (1)             76 IULR   (1)             77 IFLR   (1)
                                     78 IUBR   (1)             79 IFBR   (1)             80 IUPHTF (1)
                                     81 IFPHTF (1)             82 IUMODM (1)             83 IFMODM (1)
                                     84 IUMODK (1)             85 IFMODK (1)             86 IUPHT  (1)
                                     87 IFPHT  (1)             88 IUQT   (1)             89 IFQT   (1)
                                     90 IUQ    (1)             91 IFQ    (1)             92 IUPH   (1)
                                     93 IFPH   (1)             94 IUINCM (1)             95 IFINCM (1)
                                     96 IUINCK (1)             97 IFINCK (1)
       KLUES          24              0 KLUSE  (1)              1 KLUNAL (1)              2 IRED   (1)
                                      3 KLUMD  (1)              4 KLUBAL (1)              5 MSADD  (1)
                                      6 NPASS  (1)              7 IDNOPT (1)              8 VDES   (1)
                                      9 EPS1   (1)             10 DWMAX  (1)             11 NBAR   (1)
                                     12 NFIX   (1)             13 D      (1)             14 DEL    (1)
                                     15 EPS2   (1)             16 NCYC   (1)             17 NNN    (1)
                                     18 IBAND  (1)             19 IFIN   (1)             20 KLUB   (1)
                                     21 KLUQ   (1)             22 MORBAL (1)             23 DBAL   (1)
       WAYTS           6              0 WINITT (1)              1 WST    (1)              2 WMB    (1)
                                      3 WBOTH  (1)              4 WPRES  (1)              5 DW     (1)
       CBYTES          1              0 NBYTES (1)
       FILE           20              0 IPOS   (20)
       CORE            2              0 KORE   (1)              1 KOREDP (1)
       CLIST          11              0 KOUNT  (1)              1 KPAGE  (1)              2 LINES  (1)
                                      3 LINEST (1)              4 KLABEL (1)              5 KTPAGE (1)
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 COMMON BLOCKS   LENGTH     MEMBERS - BIAS NAME(LENGTH)
                                  6 NPAGE  (1)           7 KBPAGE (1)           8 LINESG (1)
                                  9 KOUNTH (1)          10 KOUNTI (1)
        STORES     457            0 NUMSTR (1)           1 KCONST (1)           2 ISTDOF (30)
                                 32 IDYDOF (30)         62 IDSTR  (5)          67 STRWI  (5)
                                 72 STRWO  (5)          77 STRWN  (5)          82 STRII  (15)
                                 97 STRIO  (15)        112 STRIN  (15)        127 STRRI  (15)
                                142 STRRO  (15)        157 STRRN  (15)        172 STRWDO (5)
                                177 STRWDN (5)         182 STRIDO (15)        197 STRIDN (15)
                                212 STRRDO (15)        227 STRRDN (15)        242 SCALE  (65)
                                307 STRFI  (30)        337 STRFO  (30)        367 STRFN  (30)
                                397 STRFDO (30)        427 STRFDN (30)
        STRCLU      10            0 ICYCLE (1)           1 ISTEP  (1)           2 M1     (1)
                                  3 M2     (1)           4 M3     (1)           5 M4     (1)
                                  6 VS     (1)           7 VOLD   (1)           8 VNEW   (1)
                                  9 STPOLD (1)
        LOCSTR       6            0 IUSTRI (1)           1 IFSTRI (1)           2 IUMREF (1)
                                  3 IFMREF (1)           4 IUMOD  (1)           5 IFMOD  (1)
        RESIZE      44            0 ISIZE  (1)           1 SCLNEW (20)         21 SCLOLD (20)
                                 41 ITESTO (1)          42 SAVSTP (1)          43 IDUB   (1)
        ACCEL       43            0 ISTOP  (1)           1 IPAR   (1)           2 DWNEW  (5)
                                  7 DINEW  (15)         22 DWOLD  (5)          27 DIOLD  (15)
                                 42 RILSTP (1)
        COMRWP       3            0 ITAPER (1)           1 ITAPEW (1)           2 ITAPEP (1)
        CTAPES      50            0 ITAPES (50)
        INVERT     125            0 INVERT (1)           1 IUA2   (1)           2 IFLEX  (1)
                                  3 AORD   (30)         33 IPERM  (30)         63 NSTOR  (60)
                                123 IPREV  (1)         124 NDOFT  (1)
        VSAVE        2            0 VNSAVE (1)           1 VOSAVE (1)
        CLUEV       21            0 LKLUEV (1)           1 KLUEV  (20)

 EQUIV CLASSES   LENGTH     MEMBERS - BIAS NAME(LENGTH)
        ROE         15            0 IROE   (1)
        BUFFER     310            0 IBUF   (1)
        WORK     28000            0 IWORK  (1)           0 JCHART (4)           0 CHART  (4)
NMBAL   NMBAL        1            0 MB     (1)
NUMSTR  NUMSTR       1            0 MSTOR  (1)
ICYCLE  ICYCLE       1            0 KSTOR  (1)

 STATISTICS
   PROGRAM LENGTH                71506B   29510
   CM LABELED COMMON LENGTH       2250B    1192
          52000B CM USED
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```
            SUBROUTINE DYNMAS(WORK,KORE,BUFFER,IERR,IDYFLX,IMASS,ITRNSF)      DYNMAS       2
      C                                                                       DYNMAS       3
      C                                                                       DYNMAS       4
            DIMENSION WORK(1),BUFFER(1),NR(3),NC(3),WW(3)                     DYNMAS       5
            DIMENSION NAME(2),NAMMD(2),NAMMDB(2),NAMDUM(2),NADMDB(2),NAMADD(2) DYNMAS      6
            DIMENSION NAMMS(2)                                                DYNMAS       7
            DIMENSION IPOS(20)                                                DYNMAS       8
            DIMENSION ADDMS(550),JCHART(3,1),CHART(3,1)                       DYNMAS       9
            DIMENSION PAK(20),JPAK(20)                                        DYNMAS      10
            DIMENSION NUMB(10),VALUE(10)                                      DYNMAS      11
      C                                                                       DYNMAS      12
            EQUIVALENCE (ADDMS(1),NMS),(ADDMS(2),JCHART(1,1),CHART(1,1))      DYNMAS      13
            EQUIVALENCE (PAK(1),JPAK(1))                                      DYNMAS      14
      C                                                                       DYNMAS      15
            COMMON/BAL/ NMBAL,IDBAL(20),VMBIN(20),VMBOLD(20),VMBNEW(20),      DYNMAS      16
           1            MBDOF(20,3),DRVMB(20),DRVMBO(20),                     DYNMAS      17
           2            S1MB(20),S2MB(20),S3MB(20)                            DYNMAS      18
            COMMON/PLACES/ IUIN1,IUIN2,IUOUT1,IUOUT2,IUGO1,IUGO2,IUGO3,IUGO4, DYNMAS      19
           1               IUSCR,IFSCR,IFS1,IFS2,IFS3,IFS4,IUCD,IUPR,         DYNMAS      20
           2               IUA,IFA,IUY,IFY,IUMEMN,IFMEMN,IUSTFN,IFSTFN,       DYNMAS      21
           3               IUKS,IFKS,IUB,IFB,IUDESO,IFDESO,                   DYNMAS      22
           4               IUMDBI,IFMDBI,IUADDI,IFADDI,IUBALI,IFBALI,         DYNMAS      23
           5               IUDESI,IFDESI,IUWTI,IFWTI,                         DYNMAS      24
           6               IUMEMO,IFMEMO,IUBT,IFBT,                           DYNMAS      25
           7               IUDESN,IFDESN,IUMD,IFMD,                           DYNMAS      26
           8               IUMEMF,IFMEMF,                                     DYNMAS      27
           9               IUSTFO,IFSTFO,IUMDB,IFMDB,IUADD,IFADD,IUBAL,IFBAL, DYNMAS      28
           A               IUDESF,IFDESF,IUWT,IFWT,                           DYNMAS      29
           B               IUDUM1,IFDUM1,IUDUM2,IFDUM2,IUDUM3,IFDUM3,         DYNMAS      30
           C               IUL,IFL,IUYT,IFYT,IUZ,IFZ,IUZR,IFZR,IULR,IFLR,     DYNMAS      31
           D               IUBR,IFBR,                                         DYNMAS      32
           E               IUPHTF,IFPHTF,IUMODM,IFMODM,                       DYNMAS      33
           F               IUMODK,IFMODK,IUPHT,IFPHT,IUQT,IFQT,IUQ,IFQ,       DYNMAS      34
           G               IUPH,IFPH,IUINCM,IFINCM,IUINCK,IFINCK              DYNMAS      35
            COMMON /PLAYFF/ IUMDFF,IFMDFF,IUDLTI,IFDLTI,IUSLTI,IFSLTI         DYNMAS      36
           1               ,IUMPLI,IFMPLI,IUTPGT,IFTPGT,IUPATF,IFPATF         DYNMAS      37
           2               ,IUMPL,IFMPL,IUSLT,IFSLT,IUDLT,IFDLT               DYNMAS      38
           3               ,IUQA,IFQA,IUQAT,IFQAT,IUPHA,IFPHA,IUPHAT,IFPHAT   DYNMAS      39
            COMMON/KLUES/ KLUSE,KLUNAL,IRED,KLUMD,KLUBAL,MSADD,NPASS,IDNOPT,  DYNMAS      40
           1              VDES,EPS1,DWMAX,NBAR,NFIX,D,DEL,EPS2,NCYC,NNN,IBAND, DYNMAS     41
           2              IFIN,KLUB,KLUQ,MORBAL,DBAL                          DYNMAS      42
            COMMON /KLUFF/ KFREE                                              DYNMAS      43
            COMMON/SIZES/ NSTMEM,NSTDOF,NDYDOF,NNOPT,NDESNO,NDESYS            DYNMAS      44
            COMMON /FILE  / IPOS                                              DYNMAS      45
            COMMON/WAYTS/ WINITT,WST,WMB,WBOTH,WPRES,DW                       DYNMAS      46
            COMMON /CLIST / KOUNT,KPAGE,LINES,LINEST,KLABEL,KTPAGE,NPAGE      DYNMAS      47
           1               ,KBPAGE,LINESG,KOUNTH,KOUNTI                       DYNMAS      48
            COMMON /CLUEV / LKLUEV,KLUEV(20)                                  DYNMAS      49
      C                                                                       DYNMAS      50
            DATA NAMMD /4HMD   ,4H    /,NAMMDB/4HMDB ,4H    /,                DYNMAS      51
           1     NAMDUM/4HDUMM,4HY    /,NADMDB/4HDMDB,4H    /,                DYNMAS      52
           2     NAMMS /4HMS   ,4H    /,NAMADD/4HADDM,4HS   /                 DYNMAS      53
      C                                                                       DYNMAS      54
            CALL PROGNA(4H(DYN,4HMAS))                                        DYNMAS      55
            CALL MESAGE(1,6,6HDYNMAS)                                         DYNMAS      56
            CALL TIMEB(11,11HFROM DYNMAS)                                     DYNMAS      57
      C                                                                       DYNMAS      58
```

```
      IOMD=KLUEV(4)                                                     DYNMAS    59
      IOMALL=KLUEV(5)                                                   DYNMAS    60
      IERR=0                                                            DYNMAS    61
      IF(NCYC.GT.0) GO TO 9999                                          DYNMAS    62
C                                                                       DYNMAS    63
C   *************************************************                   DYNMAS    64
C   *       THE FOLLOWING LINES OF FASTOP CODE HAVE     *               DYNMAS    65
C   *       BEEN COMMENTED OUT BECAUSE THEY ARE NOT     *               DYNMAS    66
C   *       USED IN THE CURRENT VERSION OF ESP.         *               DYNMAS    67
C   *************************************************                   DYNMAS    68
C                                                                       DYNMAS    69
C THERE ARE TWO INDEPENDENT PATHS THROUGH THIS SUBROUTINE, NAMELY PATHS DYNMAS    70
C FOR KLUMD=1 AND KLUMD=0, RESPECTIVELY.                                DYNMAS    71
C                                                                       DYNMAS    72
C     IF(KLUMD.EQ.0) GO TO 1000                                         DYNMAS    73
C                                                                       DYNMAS    74
C KLUMD=1  IF NPASS=0, READ IN THE INITIAL DYNAMIC MASS MATRIX,MDB,     DYNMAS    75
C          AND SET MD=MDB.                                              DYNMAS    76
C          IF NPASS=1, COMPUTE THE INCREMENTAL DYNAMIC MASS MATRIX      DYNMAS    77
C          (BEYOND MDB) AND UPDATE MD.                                  DYNMAS    78
C                                                                       DYNMAS    79
C     IF(NPASS.NE.0) GO TO 500                                          DYNMAS    80
C                                                                       DYNMAS    81
C                                                                       DYNMAS    82
C     IF(KLUSE.LT.2) GO TO 50                                           DYNMAS    83
C                                                                       DYNMAS    84
C READ IN TOTAL INITIAL WEIGHT (STRUCTURAL+NON-OPTIMUM ITEMS)           DYNMAS    85
C                                                                       DYNMAS    86
C     READ(IUCD,9002) WINITT                                            DYNMAS    87
C     WPRES=WINITT+WBOTH                                                DYNMAS    88
C     DW=0.0                                                            DYNMAS    89
C     WRITE(IUPR,9003) WINITT,WPRES                                     DYNMAS    90
C     KOUNT=KOUNT+5                                                     DYNMAS    91
C  50 CONTINUE                                                          DYNMAS    92
C                                                                       DYNMAS    93
C   *************************************************                   DYNMAS    94
C   *       END OF CODE THAT HAS BEEN COMMENTED OUT.    *               DYNMAS    95
C   *************************************************                   DYNMAS    96
C                                                                       DYNMAS    97
C READ IN MDB-CARDS-LOWER TRIANGLE ONLY.                                DYNMAS    98
C                                                                       DYNMAS    99
      CALL PUDLAB(8HDYNMAS01,IUMD,NAMMD,IFMD,NDYDOF,NDYDOF)             DYNMAS   100
      IF(KLUSE.NE.2) GO TO 60                                           DYNMAS   101
      IFDUM=1                                                           DYNMAS   102
      CALL PUDLAB(8HDYNMAS03,IUMDB,NAMMDB,IFDUM,NDYDOF,NDYDOF)          DYNMAS   103
      CALL PUDLAB(8HDYNMAS02,IUMDB,NAMMDB,IFMDB,NDYDOF,NDYDOF)          DYNMAS   104
C                                                                       DYNMAS   105
   60 CONTINUE                                                          DYNMAS   106
C                                                                       DYNMAS   107
      IMIN = 25                                                         DYNMAS   108
      IF (IMASS.EQ.2)  IMIN = 20                                        DYNMAS   109
      IF (IMASS.EQ.0)  GO TO 70                                         DYNMAS   110
      IF (IDYFLX.EQ.0)                                                  DYNMAS   111
     1CALL NASTRD(IMASS,IMIN,1,2,1,NDYDOF,NDYDOF,BUFFER)                DYNMAS   112
      IF (IDYFLX.NE.0)                                                  DYNMAS   113
     1CALL NASTRD(IMASS,IMIN,2,2,1,NDYDOF,NDYDOF,BUFFER)                DYNMAS   114
      NADD = 1                                                          DYNMAS   115
```

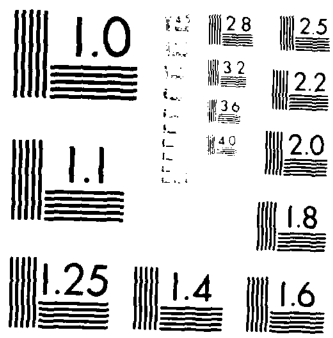
```
      C
        70 MORE = 0
           IF (IMASS.EQ.0.AND.KLUEV(8).EQ.2)
          1WRITE (6,9015) NDYDOF,NDYDOF
      C
           DO 160 I=1,NDYDOF
      C
           INEXT=I+1
           DO 80 J=1,I
        80 BUFFER(J)=0.0
           IF (IMASS.NE.0)  GO TO 140
           NADD=0
      C
           IF(MORE.NE.0) GO TO 110
      C
        85 READ(IMIN,9001) (NR(K),NC(K),WW(K),K=1,3)
           KS=1
           NCARD=0
           DO 90 K=1,3
           IF(NR(K).EQ.0) GO TO 100
        90 NCARD=NCARD+1
      C
       100 IF(NCARD.EQ.0) GO TO 170
      C
       110 DO 120 K=KS,NCARD
           IF(NR(K)-I) 210,115,130
      C
       115 L=NC(K)
      C  ******************************************************
      C  *        THE FOLLOWING LINE OF FASTOP CODE HAS       *
      C  *        BEEN COMMENTED OUT BECAUSE IT IS NOT        *
      C  *        USED IN THE CURRENT VERSION OF ESP.         *
      C  ******************************************************
      C    IF(L.LT.1.OR.L.GT.I) GO TO 211
           BUFFER(L)=WW(K)
           IF(L.EQ.I.AND.BUFFER(L).GT.0.) NADD=1
       120 CONTINUE
      C
           MORE=0
           GO TO 85
      C
       130 IF(NR(K).NE.INEXT) GO TO 212
           IF(NADD.NE.1) GO TO 213
           IF (KLUEV(8).EQ.2)
          1WRITE (6,9016) I,(BUFFER(L),L=1,I)
           GO TO 150
       140 CALL NASTRD(IMASS,IMIN,1,2,2,NDYDOF,NDYDOF,BUFFER)
       150 CONTINUE
           IF(KLUSE.EQ.2) CALL PUTROW(IUMDB,-1,BUFFER,I)
           CALL PUTROW(IUMD,1,BUFFER,I)
           KS=K
           MORE=1
      C
       160 CONTINUE
      C
           IF (IMASS.NE.0)
          1CALL NASTRD(IMASS,IMIN,1,2,3,NDYDOF,NDYDOF,BUFFER)
```

```
      IF (IMASS.NE.O)  GO TO 180
  170 IF(I.NE.NDYDOF) GO TO 214
      IF(NADD.NE.1) GO TO 213
      IF (KLUEV(8).EQ.2)
     1WRITE (6,9016) I,(BUFFER(L),L=1,I)
      IF(KLUSE.EQ.2) CALL PUTROW(IUMDB,-1,BUFFER,I)
      CALL PUTROW(IUMD,1,BUFFER,I)
  180 CALL DCLOSE(IUMD)
      IF(KLUSE.EQ.2) CALL DCLOSE(IUMDB)
C
      GO TO 9999
C
  210 MAD=210
      GO TO 220
C  ****************************************************
C  *       THE FOLLOWING LINES OF FASTOP CODE HAVE      *
C  *       BEEN COMMENTED OUT BECAUSE THEY ARE NOT      *
C  *       USED IN THE CURRENT VERSION OF ESP.          *
C  ****************************************************
C 211 MAD=211
C     GO TO 220
C  ****************************************************
C  *       END OF CODE THAT HAS BEEN COMMENTED OUT.     *
C  ****************************************************
  212 MAD=212
      GO TO 220
  213 MAD=213
      GO TO 220
  214 MAD=214
C
  220 IERR=1
C
      KOUNT=LINES
      CALL TITLES(2)
      WRITE(IUPR,9004) MAD,(NR(M),NC(M),WW(M),M=1,3)
C
C
      GO TO 9999
C
C  ****************************************************
C  *       THE FOLLOWING LINES OF FASTOP CODE HAVE      *
C  *       BEEN COMMENTED OUT BECAUSE THEY ARE NOT      *
C  *       USED IN THE CURRENT VERSION OF ESP.          *
C  ****************************************************
C
C 500 CONTINUE
C
C 1. COMPUTE DMSB--THE INCREMENTAL MASS MATRIX (STRUCT.GRID,DIAGONAL)
C    BEYOND THE INITIAL DESIGN ASSOCIATED WITH MDB.
C 2. TRANSFORM DMSB TO THE DYNAMICS GRID, DMDB=B*DMSB*BT.
C    IF IRED=O, DMDB=DMSB.
C 3. UPDATE MD, MD=MDB+DMDB
C
C     CALL STRMAS(WORK,BUFFER,2,WALL)
C
C     CALL PROGNA(4H(DYN,4HMAS))
C
```

```
C      IF(IOMALL.NE.2) GO TO 509
C      KOUNT=LINES
C      K=0
C      DO 508 I=1,NSTDOF
C      IR=I
C      IF(WORK(I).EQ.0.0) GO TO 502
C      K=K+1
C      NUMB(K)=IR
C      VALUE(K)=WORK(I)
C  502 IF(K.EQ.6) GO TO 504
C      IF(IR.EQ.NSTDOF.AND.K.GT.0) GO TO 504
C      GO TO 508
C  504 CALL TITLES(2)
C      IF(KOUNT.GT.KOUNTH) GO TO 506
C      WRITE(IUPR,9005)
C      KOUNT=KOUNT+5
C  506 WRITE(IUPR,9006) (NUMB(L),VALUE(L),L=1,K)
C      KOUNT=KOUNT+1
C      K=0
C  508 CONTINUE
C
C  509 CONTINUE
C
C      IF(IRED.EQ.0) GO TO 700
C
C      CALL GEDLAB(8HDYNMAS01,IUBT,NAME,IFBT,KROW,KCOL)
C      CALL PUDLAB(8HDYNMAS03,IUG02,NAMDUM,IFS2,KROW,KCOL)
C
C      DO 520 I=1,NSTDOF
C      CALL GETROW(IUBT,1,BUFFER,KCOL)
C      DO 510 J=1,KCOL
C  510 BUFFER(J)=BUFFER(J)*WORK(I)
C  520 CALL PUTROW(IUG02,1,BUFFER,KCOL)
C
C      CALL DCLOSE(IUBT)
C      CALL DCLOSE(IUG02)
C
C      IPOS(IUB)=IFB
C      IPOS(IUG02)=IFS2
C      IPOS(IUG01)=IFS1
C      IPOS(IUG03)=IFS3
C      IPOS(IUG04)=IFS4
C
C      CALL MULT(KORE,WORK,WORK,WORK,IUB,IUG02,IUG01,IUG03,IUG04,
C     *NADMDB,0)
C
C      IF(IOMALL.EQ.2) CALL PRMAT1(IUG01,IFS1,WORK,1,IUPR,7,81,
C     1 81H (INCREMENTAL MASS MATRIX (DYNAMIC GRID) WITH RESPECT TO INITI
C     2AL MASS MATRIX MDB))
C      CALL PROGNA(4H(DYN,4HMAS))
C
C      CALL GEDLAB(8HDYNMAS02,IUMDBI,NAME,IFMDBI,KROW,KCOL)
C      CALL GEDLAB(8HDYNMAS03,IUG01,NAME,IFS1,LROW,LCOL)
C      CALL PUDLAB(8HDYNMAS04,IUMD,NAMMD,IFMD,KROW,KCOL)
C
C      IF(KLUSE.NE.2) GO TO 530
```

AD-A152 270 ESP (EXTERNAL-STORES PROGRAM) - A PILOT COMPUTER PROGRAM FOR DETERMINING..(U) GRUMMAN AEROSPACE CORP BETHPAGE NY J B SMEDFJELD FEB 85 ADCR-85-1-VOL-3-PT-1 3/8

UNCLASSIFIED N00019-81-C-0395 F/G 9/2 NL



MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS

```
C                                                                  DYNMAS  287
C 530 CONTINUE                                                     DYNMAS  288
C                                                                  DYNMAS  289
C     DO 550 I=1,KROW                                              DYNMAS  290
C     CALL GETROW(IUMDBI,1,WORK,KCOL)                              DYNMAS  291
C     CALL GETROW(IUGO1,1,BUFFER,LCOL)                             DYNMAS  292
C     DO 540 J=1,I                                                 DYNMAS  293
C 540 BUFFER(J)=BUFFER(J)+WORK(J)                                  DYNMAS  294
C     CALL PUTROW(IUMD,1,BUFFER,I)                                 DYNMAS  295
C     IF(KLUSE.EQ.2) CALL PUTROW(IUMDB,1,WORK,I)                   DYNMAS  296
C 550 CONTINUE                                                     DYNMAS  297
C                                                                  DYNMAS  298
C     CALL DCLOSE(IUMDBI)                                          DYNMAS  299
C     CALL DCLOSE(IUGO1)                                           DYNMAS  300
C     CALL DCLOSE(IUMD)                                            DYNMAS  301
C     IF(KLUSE.EQ.2) CALL DCLOSE(IUMDB)                            DYNMAS  302
C                                                                  DYNMAS  303
C     GO TO 9999                                                   DYNMAS  304
C                                                                  DYNMAS  305
C 700 CONTINUE                                                     DYNMAS  306
C                                                                  DYNMAS  307
C     CALL GEDLAB(8HDYNMASO4,IUMDBI,NAME,IFMDBI,KROW,KCOL)         DYNMAS  308
C     CALL PUDLAB(8HDYNMASO6,IUMD,NAMMD,IFMD,KROW,KCOL)            DYNMAS  309
C     IF(KLUSE.NE.2) GO TO 720                                     DYNMAS  310
C     CALL PUDLAB(8HDYNMASO7,IUMDB,NAMMDB,IFMDB,KROW,KCOL)         DYNMAS  311
C                                                                  DYNMAS  312
C 720 CONTINUE                                                     DYNMAS  313
C                                                                  DYNMAS  314
C     DO 740 I=1,KROW                                              DYNMAS  315
C     CALL GETROW(IUMDBI,1,BUFFER,KCOL)                            DYNMAS  316
C     IF(KLUSE.EQ.2) CALL PUTROW(IUMDB,-1,BUFFER,I)                DYNMAS  317
C     BUFFER(I)=BUFFER(I)+WORK(I)                                  DYNMAS  318
C     CALL PUTROW(IUMD,1,BUFFER,I)                                 DYNMAS  319
C 740 CONTINUE                                                     DYNMAS  320
C                                                                  DYNMAS  321
C     CALL DCLOSE(IUMDBI)                                          DYNMAS  322
C     CALL DCLOSE(IUMD)                                            DYNMAS  323
C     IF(KLUSE.EQ.2) CALL DCLOSE(IUMDB)                            DYNMAS  324
C                                                                  DYNMAS  325
C                                                                  DYNMAS  326
C     GO TO 9999                                                   DYNMAS  327
C                                                                  DYNMAS  328
C                                                                  DYNMAS  329
C1000 CONTINUE                                                     DYNMAS  330
C                                                                  DYNMAS  331
C                                                                  DYNMAS  332
C KLUMD=O  1. READ IN FIXED MASS DATA-IF ANY.                      DYNMAS  333
C             (CARDS IF NPASS=O. TAPE IF NPASS=1)                  DYNMAS  334
C          2. COMPUTE THE TOTAL MASS MATRIX,MS, (STRUCT.GRID,DIAGONAL) DYNMAS  335
C             DUE TO STRUCTURAL AND MASS BALANCE ELEMENTS.         DYNMAS  336
C          3. UPDATE MS TO INCLUDE FIXED MASS ITEMS.               DYNMAS  337
C          4. TRANSFORM THE TOTAL MASS MATRIX,MS, TO THE DYNAMICS  DYNMAS  338
C             GRID- MD=B*MS*BT (IF IRED=O, MD=MS).                 DYNMAS  339
C                                                                  DYNMAS  340
C     NMS=O                                                        DYNMAS  341
C     WFIX=O.O                                                     DYNMAS  342
C     IF(MSADD.EQ.O) GO TO 1100                                    DYNMAS  343
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```
      C                                                                  DYNMAS   344
      C      IF(NPASS.NE.O) GO TO 1060                                   DYNMAS   345
      C                                                                  DYNMAS   346
      C READ IN FIXED MASS DATA-(CARDS, FULL MATRICES)                   DYNMAS   347
      C                                                                  DYNMAS   348
      C      IF(KLUSE.EQ.2) READ(IUCD,9002) WFIX                         DYNMAS   349
      C                                                                  DYNMAS   350
      C      I=O                                                         DYNMAS   351
      C      LASTR=1                                                     DYNMAS   352
      C1010 READ(IUCD,9001) (NR(K),NC(K),WW(K),K=1,3)                    DYNMAS   353
      C      IF(NR(1).EQ.O) GO TO 1030                                   DYNMAS   354
      C      DO 1020 K=1,3                                               DYNMAS   355
      C      IF(NR(K).EQ.O) GO TO 1010                                   DYNMAS   356
      C      IF(NR(K).LT.LASTR) GO TO 1040                               DYNMAS   357
      C      LASTR=NR(K)                                                 DYNMAS   358
      C      I=I+1                                                       DYNMAS   359
      C      JCHART(1,I)=NR(K)                                           DYNMAS   360
      C      JCHART(2,I)=NC(K)                                           DYNMAS   361
      C      CHART(3,I)=WW(K)                                            DYNMAS   362
      C1020 CONTINUE                                                     DYNMAS   363
      C      GO TO 1010                                                  DYNMAS   364
      C1030 NMS=I                                                        DYNMAS   365
      C                                                                  DYNMAS   366
      C      KOUNT=LINES                                                 DYNMAS   367
      C      DO 1036 I=1,NMS                                             DYNMAS   368
      C      N=I                                                         DYNMAS   369
      C      CALL TITLES(2)                                              DYNMAS   370
      C      IF(KOUNT.GT.KOUNTH) GO TO 1033                              DYNMAS   371
      C      WRITE(IUPR,9007)                                            DYNMAS   372
      C      KOUNT=KOUNT+5                                               DYNMAS   373
      C1033 CONTINUE                                                     DYNMAS   374
      C      WRITE(IUPR,9008) JCHART(1,N),JCHART(2,N),CHART(3,N)         DYNMAS   375
      C      KOUNT=KOUNT+1                                               DYNMAS   376
      C1036 CONTINUE                                                     DYNMAS   377
      C                                                                  DYNMAS   378
      C      LEFT=LINES-KOUNT                                            DYNMAS   379
      C      NEED=3                                                      DYNMAS   380
      C      IF(KLUSE.EQ.2) NEED=NEED+2                                  DYNMAS   381
      C      IF(LEFT.LT.NEED) KOUNT=LINES                                DYNMAS   382
      C      CALL TITLES(2)                                              DYNMAS   383
      C      WRITE(IUPR,9009) NMS                                        DYNMAS   384
      C      KOUNT=KOUNT+3                                               DYNMAS   385
      C      IF(KLUSE.NE.2) GO TO 1038                                   DYNMAS   386
      C      WRITE(IUPR,9014) WFIX                                       DYNMAS   387
      C      KOUNT=KOUNT+2                                               DYNMAS   388
      C1038 CONTINUE                                                     DYNMAS   389
      C                                                                  DYNMAS   390
      C      GO TO 1080                                                  DYNMAS   391
      C                                                                  DYNMAS   392
      C1040 IERR=2                                                       DYNMAS   393
      C                                                                  DYNMAS   394
      C      KOUNT=LINES                                                 DYNMAS   395
      C      CALL TITLES(2)                                              DYNMAS   396
      C      WRITE(IUPR,9010) (NR(K),NC(K),WW(K),K=1,3)                  DYNMAS   397
      C                                                                  DYNMAS   398
      C      GO TO 9999                                                  DYNMAS   399
      C                                                                  DYNMAS   400
```

```
      C1060 CONTINUE                                                          DYNMAS     401
      C                                                                       DYNMAS     402
      C READ IN FIXED MASS DATA-(TAPE)                                        DYNMAS     403
      C                                                                       DYNMAS     404
      C     CALL GEDLAB(8HDYNMAS05,IUADDI,NAME,IFADDI,JROW,JCOL)              DYNMAS     405
      C     CALL DREAD(IUADDI,ADDMS(1),4)                                     DYNMAS     406
      C     NBYTE=4*(NMS*3)                                                   DYNMAS     407
      C     CALL DREAD(IUADDI,ADDMS(2),NBYTE)                                 DYNMAS     408
      C     CALL DCLOSE(IUADDI)                                               DYNMAS     409
      C                                                                       DYNMAS     410
      C1080 CONTINUE                                                          DYNMAS     411
      C                                                                       DYNMAS     412
      C                                                                       DYNMAS     413
      C     IF(KLUSE.NE.2) GO TO 1100                                         DYNMAS     414
      C     JROW=2                                                            DYNMAS     415
      C     JCOL=9999                                                         DYNMAS     416
      C     CALL PUDLAB(8HDYNMAS08,IUADD,NAMADD,IFADD,JROW,JCOL)              DYNMAS     417
      C     CALL DWRITE(IUADD,NMS,4)                                          DYNMAS     418
      C     NBYTE=4*(NMS*3)                                                   DYNMAS     419
      C     CALL DWRITE(IUADD,ADDMS(2),NBYTE)                                 DYNMAS     420
      C     CALL DCLOSE(IUADD)                                                DYNMAS     421
      C                                                                       DYNMAS     422
      C                                                                       DYNMAS     423
      C                                                                       DYNMAS     424
      C1100 CONTINUE                                                          DYNMAS     425
      C                                                                       DYNMAS     426
      C COMPUTE MS--THE TOTAL MASS MATRIX (EXCLUDING FIXED MASS ITEMS) IN THE  DYNMAS     427
      C STRUCTURES GRID. THIS MATRIX IS DIAGONAL.                             DYNMAS     428
      C                                                                       DYNMAS     429
      C     CALL STRMAS(WORK,BUFFER,3,WALL)                                   DYNMAS     430
      C                                                                       DYNMAS     431
      C     CALL PROGNA(4H(DYN,4HMAS))                                        DYNMAS     432
      C                                                                       DYNMAS     433
      C     IF(NPASS.NE.0.OR.KLUSE.NE.2) GO TO 1105                           DYNMAS     434
      C     WINITT=WALL+WFIX                                                  DYNMAS     435
      C     WPRES=WINITT+WBOTH                                                DYNMAS     436
      C     DW=0.0                                                            DYNMAS     437
      C     LEFT=LINES-KOUNT                                                  DYNMAS     438
      C     IF(LEFT.LT.9) KOUNT=LINES                                         DYNMAS     439
      C     CALL TITLES(2)                                                    DYNMAS     440
      C     WRITE(IUPR,9011) WINITT,WALL,WFIX,WPRES                           DYNMAS     441
      C     KOUNT=KOUNT+9                                                     DYNMAS     442
      C1105 CONTINUE                                                          DYNMAS     443
      C                                                                       DYNMAS     444
      C                                                                       DYNMAS     445
      C UPDATE MS TO INCLUDE ANY FIXED MASS ITEMS AND THEN TRANSFORM TO        DYNMAS     446
      C THE DYNAMICS GRID.                                                    DYNMAS     447
      C                                                                       DYNMAS     448
      C     IF(MSADD-1) 1150,1110,1200                                        DYNMAS     449
      C                                                                       DYNMAS     450
      C1110 CONTINUE                                                          DYNMAS     451
      C                                                                       DYNMAS     452
      C MSADD=1 UPDATE MS (DIAGONAL RESULT)                                   DYNMAS     453
      C                                                                       DYNMAS     454
      C     DO 1120 I=1,NMS                                                   DYNMAS     455
      C     JR=JCHART(1,I)                                                    DYNMAS     456
      C     JC=JCHART(2,I)                                                    DYNMAS     457
```

```
C     IF(JR.NE JC) GO TO 1130                                       DYNMAS  458
C     WORK(JR)=WORK(JR)+CHART(3,I)                                  DYNMAS  459
C1120 CONTINUE                                                      DYNMAS  460
C                                                                   DYNMAS  461
C     GO TO 1150                                                    DYNMAS  462
C                                                                   DYNMAS  463
C1130 IERR=3                                                        DYNMAS  464
C     LEFT=LINES-KOUNT                                              DYNMAS  465
C     IF(LEFT.LT.5) KOUNT=LINES                                     DYNMAS  466
C     CALL TITLES(2)                                                DYNMAS  467
C     WRITE(IUPR,9012)                                              DYNMAS  468
C                                                                   DYNMAS  469
C     GO TO 9999                                                    DYNMAS  470
C                                                                   DYNMAS  471
C1150 CONTINUE                                                      DYNMAS  472
C                                                                   DYNMAS  473
C TRANSFORM DIAGONAL MS TO MD.  MD=B*MS*BT (IF IRED=0,MD=MS)        DYNMAS  474
C                                                                   DYNMAS  475
C     IF(IRED.EQ.0) GO TO 1180                                      DYNMAS  476
C                                                                   DYNMAS  477
C     IF(IOMALL.NE.2) GO TO 1159                                    DYNMAS  478
C     KOUNT=LINES                                                   DYNMAS  479
C     K=0                                                           DYNMAS  480
C     DO 1158 I=1,NSTDOF                                            DYNMAS  481
C     IR=I                                                          DYNMAS  482
C     IF(WORK(I).EQ.0.0) GO TO 1152                                 DYNMAS  483
C     K=K+1                                                         DYNMAS  484
C     NUMB(K)=IR                                                    DYNMAS  485
C     VALUE(K)=WORK(I)                                              DYNMAS  486
C1152 IF(K.EQ.6) GO TO 1154                                         DYNMAS  487
C     IF(IR.EQ.NSTDOF.AND.K.GT.0) GO TO 1154                        DYNMAS  488
C     GO TO 1158                                                    DYNMAS  489
C1154 CALL TITLES(2)                                                DYNMAS  490
C     IF(KOUNT.GT.KOUNTH) GO TO 1156                                DYNMAS  491
C     WRITE(IUPR,9013)                                              DYNMAS  492
C     KOUNT=KOUNT+5                                                 DYNMAS  493
C1156 WRITE(IUPR,9006) (NUMB(L),VALUE(L),L=1,K)                     DYNMAS  494
C     KOUNT=KOUNT+1                                                 DYNMAS  495
C     K=0                                                           DYNMAS  496
C1158 CONTINUE                                                      DYNMAS  497
C                                                                   DYNMAS  498
C1159 CONTINUE                                                      DYNMAS  499
C                                                                   DYNMAS  500
C     CALL GEDLAB(8HDYNMAS06,IUBT,NAME,IFBT,KROW,KCOL)              DYNMAS  501
C     CALL PUDLAB(8HDYNMAS09,IUG03,NAMDUM,IFS3,KROW,KCOL)           DYNMAS  502
C                                                                   DYNMAS  503
C     DO 1170 I=1,NSTDOF                                            DYNMAS  504
C     CALL GETROW(IUBT,1,BUFFER,KCOL)                               DYNMAS  505
C     DO 1160 J=1,KCOL                                              DYNMAS  506
C1160 BUFFER(J)=BUFFER(J)*WORK(I)                                   DYNMAS  507
C1170 CALL PUTROW(IUG03,1,BUFFER,KCOL)                              DYNMAS  508
C                                                                   DYNMAS  509
C     CALL DCLOSE(IUBT)                                             DYNMAS  510
C     CALL DCLOSE(IUG03)                                            DYNMAS  511
C                                                                   DYNMAS  512
C     IPOS(IUB)=IFB                                                 DYNMAS  513
```

```
C      IPOS(IUMD)=IFMD                                                    DYNMAS    515
C      IPOS(IUGO1)=IFS1                                                   DYNMAS    516
C      IPOS(IUGO4)=IFS4                                                   DYNMAS    517
C                                                                         DYNMAS    518
C      CALL MULT(KORE,WORK,WORK,WORK,IUB,IUGO3,IUMD,IUGO1,IUGO4,NAMMD,O)  DYNMAS    519
C      CALL PROGNA(4H(DYN,4HMAS))                                         DYNMAS    520
C                                                                         DYNMAS    521
C                                                                         DYNMAS    522
C      GO TO 9999                                                         DYNMAS    523
C                                                                         DYNMAS    524
C1180 CONTINUE                                                            DYNMAS    525
C                                                                         DYNMAS    526
C      CALL PUDLAB(8HDYNMAS10,IUMD,NAMMD,IFMD,NSTDOF,NSTDOF)              DYNMAS    527
C      DO 1185 I=1,NSTDOF                                                 DYNMAS    528
C      CALL PUTROW(IUMD,-1,WORK,I)                                        DYNMAS    529
C      WORK(I)=0.0                                                        DYNMAS    530
C1185 CONTINUE                                                            DYNMAS    531
C      CALL DCLOSE(IUMD)                                                  DYNMAS    532
C                                                                         DYNMAS    533
C      GO TO 9999                                                         DYNMAS    534
C                                                                         DYNMAS    535
C                                                                         DYNMAS    536
C1200 CONTINUE                                                            DYNMAS    537
C                                                                         DYNMAS    538
C MSADD=2  UPDATE MS (OFF DIAGONAL TERMS ARE PRESENT)                     DYNMAS    539
C                                                                         DYNMAS    540
C      IF(IRED.EQ.0) CALL PUDLAB(8HDYNMAS11,IUMD,NAMMD,IFMD,              DYNMAS    541
C     1                             NDYDOF,NDYDOF)                        DYNMAS    542
C      IF(IRED.NE.0) CALL PUDLAB(8HDYNMAS12,IUMD,NAMMS,IFMD,              DYNMAS    543
C     1                             NSTDOF,NSTDOF)                        DYNMAS    544
C                                                                         DYNMAS    545
C      KLUPAK=-2                                                          DYNMAS    546
C      LYNE=1                                                             DYNMAS    547
C      MORE=1                                                             DYNMAS    548
C      KUP=NSTDOF-6                                                       DYNMAS    549
C                                                                         DYNMAS    550
C      DO 1400 I=1,NSTDOF                                                 DYNMAS    551
C      IF(MORE.EQ.0) GO TO 1210                                           DYNMAS    552
C      MROW=JCHART(1,LYNE)                                                DYNMAS    553
C      IF(I.EQ.MROW) GO TO 1250                                           DYNMAS    554
C                                                                         DYNMAS    555
C1210 JPAK(1)=1-I                                                         DYNMAS    556
C      JPAK(2)=1                                                          DYNMAS    557
C      PAK(3)=WORK(I)                                                     DYNMAS    558
C      JPAK(4)=I-NSTDOF                                                   DYNMAS    559
C                                                                         DYNMAS    560
C      NCOUNT=4                                                           DYNMAS    561
C      IF(I.EQ.1.OR.I.EQ.NSTDOF) NCOUNT=3                                 DYNMAS    562
C                                                                         DYNMAS    563
C      CALL DWRITE(IUMD,NCOUNT,4)                                         DYNMAS    564
C      CALL DWRITE(IUMD,KLUPAK,4)                                         DYNMAS    565
C                                                                         DYNMAS    566
C      J=1                                                                DYNMAS    567
C      IF(I.EQ.1) J=2                                                     DYNMAS    568
C      NBYTE=4*NCOUNT                                                     DYNMAS    569
C                                                                         DYNMAS    570
C      CALL DWRITE(IUMD,PAK(J),NBYTE)                                     DYNMAS    571
```

```
C      GO TO 1400                                                        DYNMAS   572
C                                                                        DYNMAS   573
C1250 CONTINUE                                                           DYNMAS   574
C                                                                        DYNMAS   575
C      DO 1260 L=1,15                                                    DYNMAS   576
C1260 PAK(L)=0.0                                                         DYNMAS   577
C                                                                        DYNMAS   578
C      IF(I.GT.6) GO TO 1270                                             DYNMAS   579
C                                                                        DYNMAS   580
C      JPAK(1)=11                                                        DYNMAS   581
C      IC=1+I                                                            DYNMAS   582
C      JPAK(13)=11-NSTDOF                                                DYNMAS   583
C      NCOUNT=13                                                         DYNMAS   584
C      GO TO 1300                                                        DYNMAS   585
C                                                                        DYNMAS   586
C1270 IF(I.GT.KUP) GO TO 1280                                            DYNMAS   587
C                                                                        DYNMAS   588
C      JPAK(1)=6-I                                                       DYNMAS   589
C      JPAK(2)=11                                                        DYNMAS   590
C      IC=8                                                              DYNMAS   591
C      JPAK(14)=(5+I)-NSTDOF                                             DYNMAS   592
C      NCOUNT=14                                                         DYNMAS   593
C      GO TO 1300                                                        DYNMAS   594
C                                                                        DYNMAS   595
C1280 JPAK(1)=11-NSTDOF                                                  DYNMAS   596
C      JPAK(2)=11                                                        DYNMAS   597
C      IC=13-(NSTDOF-I)                                                  DYNMAS   598
C      NCOUNT=13                                                         DYNMAS   599
C                                                                        DYNMAS   600
C1300 CONTINUE                                                           DYNMAS   601
C      PAK(IC)=WORK(I)                                                   DYNMAS   602
C1310 MCOL=JCHART(2,LYNE)                                                DYNMAS   603
C      KK=IC+(MCOL-MROW)                                                 DYNMAS   604
C      PAK(KK)=PAK(KK)+CHART(3,LYNE)                                     DYNMAS   605
C      LYNE=LYNE+1                                                       DYNMAS   606
C      IF(LYNE.GT.NMS) MORE=0                                            DYNMAS   607
C      IF(MORE.EQ.0) GO TO 1350                                          DYNMAS   608
C                                                                        DYNMAS   609
C      MROW=JCHART(1,LYNE)                                               DYNMAS   610
C      IF(MROW.EQ.I) GO TO 1310                                          DYNMAS   611
C                                                                        DYNMAS   612
C1350 CONTINUE                                                           DYNMAS   613
C                                                                        DYNMAS   614
C      CALL DWRITE(IUMD,NCOUNT,4)                                        DYNMAS   615
C      CALL DWRITE(IUMD,KLUPAK,4)                                        DYNMAS   616
C      NBYTE=4*NCOUNT                                                    DYNMAS   617
C      CALL DWRITE(IUMD,PAK(1),NBYTE)                                    DYNMAS   618
C                                                                        DYNMAS   619
C                                                                        DYNMAS   620
C                                                                        DYNMAS   621
C1400 CONTINUE                                                           DYNMAS   622
C                                                                        DYNMAS   623
C                                                                        DYNMAS   624
C      CALL DCLOSE(IUMD)                                                 DYNMAS   625
C                                                                        DYNMAS   626
C                                                                        DYNMAS   627
C TRANSFORM MS TO THE DYNAMICS GRID, MD=B*MS*BT   (IF IRED=0, MD=MS)     DYNMAS   628
```

```
C
C     IF(IRED.EQ.0) GO TO 9999
C
C     IF(IOMALL.EQ.2) CALL PRMAT2(IUMD,IFMD,WORK,1,IUPR,4,71,
C    1 71H (MASS MATRIX GENERATED IN FULLY AUTOMATED MASS OPTION-STRUCTU
C    2RES GRID))
C
C     IPOS(IUMD)=IFMD
C     IPOS(IUBT)=IFBT
C     IPOS(IUGO3)=IFS3
C     IPOS(IUIN1)=IFSCR
C     IPOS(IUGO4)=IFS4
C
C     CALL MULT(KORE,WORK,WORK,WORK,IUMD,IUBT,IUGO3,IUIN1,IUGO4,
C    *NAMDUM,0)
C
C
C     IPOS(IUB)=IFB
C     IPOS(IUGO3)=IFS3
C     IPOS(IUMD)=IFMD
C     IPOS(IUGO1)=IFS1
C     IPOS(IUGO4)=IFS4
C
C     CALL MULT(KORE,WORK,WORK,WORK,IUB,IUGO3,IUMD,IUGO1,IUGO4,NAMMD,0)
C     CALL PROGNA(4H(DYN,4HMAS))
C
C  ******************************************************
C  *       END OF CODE THAT HAS BEEN COMMENTED OUT.     *
C  ******************************************************
C
 9001 FORMAT(3(2I4,F15.5,1X))
 9002 FORMAT(E15.5)
 9003 FORMAT(/,10X,   45HINITIAL WEIGHT (EXCLUDING ANY MASS BALANCE) =,
     1      F15.4,
     2     //,10X,    22HPRESENT TOTAL WEIGHT =,F15.4,/)
 9004 FORMAT(/,10X,   42HTHERE IS AN ERROR IN THE INITIAL MASS DATA,
     1      //,10X,   33H(MAD=210) DATA IS NOT IN ROW SORT,
     2      //,10X,   42H(MAD=211) DATA LIES OUTSIDE LOWER TRIANGLE,
     3      //,10X,   31H(MAD=212) ENTIRE ROW IS MISSING,
     4      //,10X,   39H(MAD=213) DIAGONAL TERM IS NOT POSITIVE,
     5      //,10X,   32H(MAD=214) BLANK CARD ENCOUNTERED,
     6     ///,10X,   22HCURRENT VALUE OF MAD =,I5,
     7      //,10X,   27HOFFENDING DATA CARD FOLLOWS,
     8      //,10X,3(2I4,F15.5,1X),/)
 9005 FORMAT(/,10X,   43HINCREMENTAL MASS MATRIX(STRUCT. GRID) WITH ,
     1                35HRESPECT TO INITIAL MASS MATRIX MDB.,
     2      //,10X, 6(20H  ROW         VALUE),/)
 9006 FORMAT(10X,6(I5,1PE15.5))
 9007 FORMAT(/,10X,   45HFIXED ADDITIONS TO MASS MATRIX (STRUCT. GRID),
     1      //,10X,   25H  ROW  COL          VALUE,/)
 9008 FORMAT(10X,2I5,1PE15.5)
 9009 FORMAT(/,10X,   10HTHERE ARE ,I5,   24H FIXED ADDITIONS TO THE ,
     1                23HSTRUCTURAL MASS MATRIX.,/)
 9010 FORMAT(/,10X,   39HTHE FIXED MASS DATA IS NOT IN ROW SORT.,
     1      //,10X,   38HTHE OFFENDING DATA CARD IS SHOWN BELOW,
     2      //,10X,3(2I4,F15.5,1X),/)
```

```
             1      //,1CX,    31HCONTRIBUTION DUE TO STRUCTURE =,F12.4,         DYNMAS    686
             2      //,10X,    42HCONTRIBUTION DUE TO FIXED MASS ADDITIONS =,    DYNMAS    687
             3      F12.4,                                                       DYNMAS    688
             4      //,10X,    22HPRESENT TOTAL WEIGHT =,F12.4,/)                DYNMAS    689
       9012 FORMAT(/,10X,      44HOFF-DIAGONAL TERMS ARE PRESENT IN THE FIXED ,  DYNMAS    690
             1                 15HMASS ADDITIONS.,                               DYNMAS    691
             2      //,10X,    45HHOWEVER, THE USER DID NOT SO INDICATE IN THE , DYNMAS    692
             3                 34HINPUT CLUES. (TERMINATE EXECUTION),/)          DYNMAS    693
       9013 FORMAT(/,10X,      47HMASS MATRIX (STRUCT. GRID) INCLUDING FIXED MASS DYNMAS    694
             1                 15H ITEMS-(IF ANY),                               DYNMAS    695
             2      //,10X, 6(20H  ROW          VALUE),/)                        DYNMAS    696
       9014 FORMAT(10X,35HTHE TOTAL WEIGHT OF THESE ITEMS IS ,F15.4,/)           DYNMAS    697
       9015 FORMAT (1H1,9X,8HREADING ,I3,3H X ,I3,                               DYNMAS    698
             1         41H DYNAMIC MASS MATRIX FROM CARD-IMAGE FILE/             DYNMAS    699
             2         15X,24H(LOWER TRIANGLE PRINTED))                          DYNMAS    700
       9016 FORMAT (//15X,4HROW ,I3//(1P10E12.4))                                DYNMAS    701
      C                                                                          DYNMAS    702
      C                                                                          DYNMAS    703
       9999 CONTINUE                                                             DYNMAS    704
      C                                                                          DYNMAS    705
            IF(IERR.NE.0) STOP                                                   DYNMAS    706
      C                                                                          DYNMAS    707
      C                                                                          DYNMAS    708
            IF (KLUSE.LE.0)  GO TO 9940                                          DYNMAS    709
            IUNIT=IUMD                                                           DYNMAS    710
            IFILE=IFMD                                                           DYNMAS    711
            NCIC=NCYC                                                            DYNMAS    712
            CALL MASTOR(WORK,BUFFER.IUNIT,IFILE,NCIC)                            DYNMAS    713
            CALL PROGNA(4H(DYN,4HMAS))                                           DYNMAS    714
       9940 CONTINUE                                                             DYNMAS    715
      C                                                                          DYNMAS    716
            IUCOM=IUMD                                                           DYNMAS    717
            IFCOM=IFMD                                                           DYNMAS    718
      C                                                                          DYNMAS    719
      C IF THE STRUCTURE IS FREE-FREE, ADJUST THE MASS MATRIX                    DYNMAS    720
      C                                                                          DYNMAS    721
            IF(KFREE.NE.2) GO TO 9950                                            DYNMAS    722
            CALL FFMASS(WORK(1),WORK(25000),WORK(26000),WORK(27000),             DYNMAS    723
           1             BUFFER(1),IDYFLX,IMASS,ITRNSF,IMIN)                     DYNMAS    724
            CALL PROGNA(4H(DYN,4HMAS))                                           DYNMAS    725
            IUCOM=IUMDFF                                                         DYNMAS    726
            IFCOM=IFMDFF                                                         DYNMAS    727
      C                                                                          DYNMAS    728
       9950 CONTINUE                                                             DYNMAS    729
      C                                                                          DYNMAS    730
            IF(IOMD.NE.2) GO TO 9990                                             DYNMAS    731
      C                                                                          DYNMAS    732
            IF(KFREE.EQ.2) GO TO 9970                                            DYNMAS    733
            IF(IRED.EQ.0) GO TO 9980                                             DYNMAS    734
            IF(NPASS.EQ.0.AND.KLUMD.EQ.1) GO TO 9980                             DYNMAS    735
      C                                                                          DYNMAS    736
       9970 CALL PRMAT1(IUCOM,IFCOM,WORK,1,IUPR,7,47,                            DYNMAS    737
           1 47H (MASS MATRIX TO BE USED IN VIBRATION ANALYSIS))                 DYNMAS    738
            GO TO 9990                                                           DYNMAS    739
       9980 CALL PRMAT2(IUCOM,IFCOM,WORK,1,IUPR,4,47,                            DYNMAS    740
           1 47H (MASS MATRIX TO BE USED IN VIBRATION ANALYSIS))                 DYNMAS    741
      C                                                                          DYNMAS    742
```

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               9990 CONTINUE                                                                  DYNMAS     743
              C                                                                               DYNMAS     744
              C                                                                               DYNMAS     745
   745              CALL PROGNA(4H(DYN,4HMAS))                                                DYNMAS     746
                    CALL TIMEB(11,11HFROM DYNMAS)                                             DYNMAS     747
                    CALL MESAGE(2,6,6HDYNMAS)                                                 DYNMAS     748
              C                                                                               DYNMAS     749
                    RETURN                                                                    DYNMAS     750
   750              END                                                                       DYNMAS     751


CARD NR. SEVERITY  DETAILS    DIAGNOSIS OF PROBLEM

   722      I      WORK      ARRAY REFERENCE OUTSIDE DIMENSION BOUNDS.
   722      I      WORK      ARRAY REFERENCE OUTSIDE DIMENSION BOUNDS.
   722      I      WORK      ARRAY REFERENCE OUTSIDE DIMENSION BOUNDS.


      SYMBOLIC REFERENCE MAP (R=3)

 ENTRY POINTS      DEF LINE      REFERENCES
    3  DYNMAS          1          749

 VARIABLES       SN  TYPE            RELOCATION
   1204  ADDMS       REAL      *UNDEF                  REFS          8       2*12
      0  BUFFER      REAL       ARRAY      F.P.        REFS          4        110       112       150       158       161       163
                                                        164        170        175       177       178       712       722
                                                     DEFINED          1        124       149
   1205  CHART       REAL      *UNDEF                  REFS          8         12
     15  D           REAL                  KLUES       REFS         39
     27  DBAL        REAL                  KLUES       REFS         39
     16  DEL         REAL                  KLUES       REFS         39
    215  DRVMB       REAL       ARRAY      BAL         REFS         15
    241  DRVMBO      REAL       ARRAY      BAL         REFS         15
      5  DW          REAL                  WAYTS       REFS         45
     12  DWMAX       REAL                  KLUES       REFS         39
     11  EPS1        REAL                  KLUES       REFS         39
     17  EPS2        REAL                  KLUES       REFS         39
   1142  I           INTEGER                           REFS        122        123       140       150     2*158       163       164
                                                        173      2*175        177       178   DEFINED       120
     22  IBAND       INTEGER               KLUES       REFS         39
      1  IDBAL       INTEGER    ARRAY      BAL         REFS         15
      7  IDNOPT      INTEGER               KLUES       REFS         39
      0  IDYFLX      INTEGER               F.P.        REFS        110        112       722   DEFINED         1
      0  IERR        INTEGER               F.P.        REFS        705    DEFINED         1        60       202
     21  IFA         INTEGER               PLACES      REFS         18
     67  IFADD       INTEGER               PLACES      REFS         18
     41  IFADDI      INTEGER               PLACES      REFS         18
     33  IFB         INTEGER               PLACES      REFS         18
     71  IFBAL       INTEGER               PLACES      REFS         18
     43  IFBALI      INTEGER               PLACES      REFS         18
    117  IFBR        INTEGER               PLACES      REFS         18
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VARIABLES      SN  TYPE            RELOCATION
   53  IFBT        INTEGER             PLACES      REFS      18
 1157  IFCOM       INTEGER                         REFS     736      739    DEFINED      717      726
   73  IFDESF      INTEGER             PLACES      REFS      18
   45  IFDESI      INTEGER             PLACES      REFS      18
   55  IFDESN      INTEGER             PLACES      REFS      18
   35  IFDESO      INTEGER             PLACES      REFS      18
   21  IFDLT       INTEGER             PLAYFF      REFS      35
    3  IFDLTI      INTEGER             PLAYFF      REFS      35
 1136  IFDUM       INTEGER                         REFS     102   DEFINED      101
   77  IFDUM1      INTEGER             PLACES      REFS      18
  101  IFDUM2      INTEGER             PLACES      REFS      18
  103  IFDUM3      INTEGER             PLACES      REFS      18
 1154  IFILE       INTEGER                         REFS     712   DEFINED      710
   23  IFIN        INTEGER             KLUES       REFS      39
  141  IFINCK      INTEGER             PLACES      REFS      18
  137  IFINCM      INTEGER             PLACES      REFS      18
   31  IFKS        INTEGER             PLACES      REFS      18
  105  IFL         INTEGER             PLACES      REFS      18
  115  IFLR        INTEGER             PLACES      REFS      18
   57  IFMD        INTEGER             PLACES      REFS      18       99        710      717
   65  IFMDB       INTEGER             PLACES      REFS      18      103
   37  IFMDBI      INTEGER             PLACES      REFS      18
    1  IFMDFF      INTEGER             PLAYFF      REFS      35      726
   61  IFMEMF      INTEGER             PLACES      REFS      18
   25  IFMEMN      INTEGER             PLACES      REFS      18
   51  IFMEMO      INTEGER             PLACES      REFS      18
  125  IFMODK      INTEGER             PLACES      REFS      18
  123  IFMODM      INTEGER             PLACES      REFS      18
   15  IFMPL       INTEGER             PLAYFF      REFS      35
    7  IFMPLI      INTEGER             PLAYFF      REFS      35
   13  IFPATF      INTEGER             PLAYFF      REFS      35
  135  IFPH        INTEGER             PLACES      REFS      18
   27  IFPHA       INTEGER             PLAYFF      REFS      35
   31  IFPHAT      INTEGER             PLAYFF      REFS      35
  127  IFPHT       INTEGER             PLACES      REFS      18
  121  IFPHTF      INTEGER             PLACES      REFS      18
  133  IFQ         INTEGER             PLACES      REFS      18
   23  IFQA        INTEGER             PLAYFF      REFS      35
   25  IFQAT       INTEGER             PLAYFF      REFS      35
  131  IFQT        INTEGER             PLACES      REFS      18
   11  IFSCR       INTEGER             PLACES      REFS      18
   17  IFSLT       INTEGER             PLAYFF      REFS      35
    5  IFSLTI      INTEGER             PLAYFF      REFS      35
   27  IFSTFN      INTEGER             PLACES      REFS      18
   63  IFSTFO      INTEGER             PLACES      REFS      18
   12  IFS1        INTEGER             PLACES      REFS      18
   13  IFS2        INTEGER             PLACES      REFS      18
   14  IFS3        INTEGER             PLACES      REFS      18
   15  IFS4        INTEGER             PLACES      REFS      18
   11  IFTPGT      INTEGER             PLAYFF      REFS      35
   75  IFWT        INTEGER             PLACES      REFS      18
   47  IFWTI       INTEGER             PLACES      REFS      18
   23  IFY         INTEGER             PLACES      REFS      18
  107  IFYT        INTEGER             PLACES      REFS      18
  111  IFZ         INTEGER             PLACES      REFS      18
  113  IFZR        INTEGER             PLACES      REFS      18
    0  IMASS       INTEGER             F.P.        REFS     108      109        110      112      117      125      161
```

```
VARIABLES        SN  TYPE            RELOCATION
                                                    2*170      172       722   DEFINED        1
 1137  IMIN          INTEGER                         REFS      110       112      161       170       722
                                                  DEFINED      107       108   I/O REFS     130
 1143  INEXT         INTEGER                         REFS      156   DEFINED      122
 1135  IOMALL      * INTEGER                      DEFINED       59
 1134  IOMD          INTEGER                         REFS      730   DEFINED       58
    0  IPOS          INTEGER     ARRAY    FILE       REFS        7        44
    2  IRED          INTEGER              KLUES      REFS       39       733
    0  ITRNSF        INTEGER              F.P.       REFS      722   DEFINED        1
   20  IUA           INTEGER              PLACES     REFS       18
   66  IUADD         INTEGER              PLACES     REFS       18
   40  IUADDI        INTEGER              PLACES     REFS       18
   32  IUB           INTEGER              PLACES     REFS       18
   70  IUBAL         INTEGER              PLACES     REFS       18
   42  IUBALI        INTEGER              PLACES     REFS       18
  116  IUBR          INTEGER              PLACES     REFS       18
   52  IUBT          INTEGER              PLACES     REFS       18
   16  IUCD          INTEGER              PLACES     REFS       18
 1156  IUCOM         INTEGER                         REFS      736       739   DEFINED      716       725
   72  IUDESF        INTEGER              PLACES     REFS       18
   44  IUDESI        INTEGER              PLACES     REFS       18
   54  IUDESN        INTEGER              PLACES     REFS       18
   34  IUDESO        INTEGER              PLACES     REFS       18
   20  IUDLT         INTEGER              PLAYFF     REFS       35
    2  IUDLTI        INTEGER              PLAYFF     REFS       35
   76  IUDUM1        INTEGER              PLACES     REFS       18
  100  IUDUM2        INTEGER              PLACES     REFS       18
  102  IUDUM3        INTEGER              PLACES     REFS       18
    4  IUGO1         INTEGER              PLACES     REFS       18
    5  IUGO2         INTEGER              PLACES     REFS       18
    6  IUGO3         INTEGER              PLACES     REFS       18
    7  IUGO4         INTEGER              PLACES     REFS       18
  140  IUINCK        INTEGER              PLACES     REFS       18
  136  IUINCM        INTEGER              PLACES     REFS       18
    0  IUIN1         INTEGER              PLACES     REFS       18
    1  IUIN2         INTEGER              PLACES     REFS       18
   30  IUKS          INTEGER              PLACES     REFS       18
  104  IUL           INTEGER              PLACES     REFS       18
  114  IULR          INTEGER              PLACES     REFS       18
   56  IUMD          INTEGER              PLACES     REFS       18        99       164       178       179       709       716
   64  IUMDB         INTEGER              PLACES     REFS       18       102       103       163       177       180
   36  IUMDBI        INTEGER              PLACES     REFS       18
    0  IUMDFF        INTEGER              PLAYFF     REFS       35       725
   60  IUMEMF        INTEGER              PLACES     REFS       18
   24  IUMEMN        INTEGER              PLACES     REFS       18
   50  IUMEMO        INTEGER              PLACES     REFS       18
  124  IUMODK        INTEGER              PLACES     REFS       18
  122  IUMODM        INTEGER              PLACES     REFS       18
   14  IUMPL         INTEGER              PLAYFF     REFS       35
    6  IUMPLI        INTEGER              PLAYFF     REFS       35
 1153  IUNIT         INTEGER                         REFS      712   DEFINED      709
    2  IUOUT1        INTEGER              PLACES     REFS       18
    3  IUOUT2        INTEGER              PLACES     REFS       18
   12  IUPATF        INTEGER              PLAYFF     REFS       35
  134  IUPH          INTEGER              PLACES     REFS       18
   26  IUPHA         INTEGER              PLAYFF     REFS       35
```

```
VARIABLES      SN   TYPE            RELOCATION
   126   IUPHT    INTEGER              PLACES       REFS       18
   120   IUPHTF   INTEGER              PLACES       REFS       18
    17   IUPR     INTEGER              PLACES       REFS       18       736       739    I/O REFS     206
   132   IUQ      INTEGER              PLACES       REFS       18
    22   IUQA     INTEGER              PLAYFF       REFS       35
    24   IUQAT    INTEGER              PLAYFF       REFS       35
   130   IUQT     INTEGER              PLACES       REFS       18
    10   IUSCR    INTEGER              PLACES       REFS       18
    16   IUSLT    INTEGER              PLAYFF       REFS       35
     4   IUSLTI   INTEGER              PLAYFF       REFS       35
    26   IUSTFN   INTEGER              PLACES       REFS       18
    62   IUSTFO   INTEGER              PLACES       REFS       18
    10   IUTPGT   INTEGER              PLAYFF       REFS       35
    74   IUWT     INTEGER              PLACES       REFS       18
    46   IUWTI    INTEGER              PLACES       REFS       18
    22   IUY      INTEGER              PLACES       REFS       18
   106   IUYT     INTEGER              PLACES       REFS       18
   110   IUZ      INTEGER              PLACES       REFS       18
   112   IUZR     INTEGER              PLACES       REFS       18
  1144   J        INTEGER                           REFS      124    DEFINED      123
  1205   JCHART   INTEGER    *UNDEF                 REFS        8        12
  1160   JPAK     INTEGER    *UNDEF                 REFS        9        13
  1145   K        INTEGER                           REFS    3*130       134       140       142       149       156       165
                                                 DEFINED      130       133       139
     7   KBPAGE   INTEGER              CLIST        REFS       46
     0   KFREE    INTEGER              KLUFF        REFS       42       721       732
     4   KLABEL   INTEGER              CLIST        REFS       46
    24   KLUB     INTEGER              KLUES        REFS       39
     4   KLUBAL   INTEGER              KLUES        REFS       39
     1   KLUEV    INTEGER    ARRAY     CLUEV        REFS       48        58        59       117       158       175
     3   KLUMD    INTEGER              KLUES        REFS       39       734
     1   KLUNAL   INTEGER              KLUES        REFS       39
    25   KLUQ     INTEGER              KLUES        REFS       39
     0   KLUSE    INTEGER              KLUES        REFS       39       100       163       177       180       708
     0   KORE     INTEGER    *UNUSED    F.P.     DEFINED        1
     0   KOUNT    INTEGER              CLIST        REFS       46    DEFINED      204
    11   KOUNTH   INTEGER              CLIST        REFS       46
    12   KOUNTI   INTEGER              CLIST        REFS       46
     1   KPAGE    INTEGER              CLIST        REFS       46
  1146   KS       INTEGER                           REFS      139    DEFINED      131       165
     5   KTPAGE   INTEGER              CLIST        REFS       46
  1150   L        INTEGER                           REFS      149     2*150       158       175    DEFINED      142       158
                                                    175
     2   LINES    INTEGER              CLIST        REFS       46       204
    10   LINESG   INTEGER              CLIST        REFS       46
     3   LINEST   INTEGER              CLIST        REFS       46
     0   LKLUEV   INTEGER              CLUEV        REFS       48
  1152   M        INTEGER                           REFS    3*206    DEFINED      206
  1151   MAD      INTEGER                           REFS      206    DEFINED      184       196       198       200
   121   MBDOF    INTEGER    ARRAY     BAL          REFS       15
    26   MORBAL   INTEGER              KLUES        REFS       39
  1141   MORE     INTEGER                           REFS      128    DEFINED      116       153       166
     5   MSADD    INTEGER              KLUES        REFS       39
  1140   NADD     INTEGER                           REFS      157       174    DEFINED      114       126       150
  2273   NADMDB   INTEGER    ARRAY                  REFS        5    DEFINED       50
  2275   NAMADD   INTEGER    ARRAY                  REFS        5    DEFINED       50
  2271   NAMDUM   INTEGER    ARRAY                  REFS        5    DEFINED       50
```

```
C
C FORM PRODUCT OF LAMBDA(TRAN)*MD. STORE RESULT IN ELTMD
C
      LROW=NCOL
      LCOL=NROW
      DO 80 I=1,LCOL
      DO 80 K=1,MCOL
      A=0.0
      DO 75 J=1,LROW
      IF(K.LE.J) L=((J-1)*J/2)+K
      IF(K.GT.J) L=((K-1)*K/2)+J
      A=A+ELAM(J,I)*EMAS(L)
   75 CONTINUE
      ELTMD(I,K)=A
   80 CONTINUE
C
C FORM THE PRODUCT LAMBDA(TRAN)*MD*LAMBDA. STORE RESULT IN XM
C
      DO 82 I=1,3
      DO 82 J=1,3
   82 XM(I,J)=0.0
C
      DO 90 I=1,LCOL
      DO 90 K=1,LCOL
      A=0.0
      DO 85 J=1,LROW
      A=A+ELTMD(I,J)*ELAM(J,K)
   85 CONTINUE
      XM(I,K)=A
   90 CONTINUE
      IF(NCYC.GT.0) GO TO 130
C
C READ PLUG MASS INTO CORE.
C (IF NPASS=0, DATA IS ON CARDS. OTHERWISE, DATA IS ON TAPE.)
C
      DO 100 I=1,3
      DO 100 J=1,3
      EMP(I,J)=0.0
      IF(J.EQ.I) EMP(I,J)=1.0
  100 CONTINUE
C
      IF(NPASS.NE.0) GO TO 120
C
      IF (IMASS.EQ.0)  GO TO 105
      CALL NASTRD(IMASS,IMIN,2,4,1,NPGDOF,NPGDOF,EMP(1,1))
      DO 102 I=1,NPGDOF
      CALL NASTRD(IMASS,IMIN,2,4,2,NPGDOF,NPGDOF,EMP(1,I))
  102 CONTINUE
      GO TO 112
  105 READ (IMIN,9000) (NR(K),NC(K),WW(K),K=1,3)
      NCARD=0
      DO 110 K=1,3
      IF(NR(K).EQ.0) GO TO 110
      EMP(NR(K),NC(K))=WW(K)
      EMP(NC(K),NR(K))=WW(K)
      NCARD=NCARD+1
  110 CONTINUE
```

```
      CALL GETROW(IUMD,1,EMAS(J),MCOL)
      J=J+I
   50 CONTINUE
      CALL DCLOSE(IUMD)
C
C READ DYNAMIC LAMBDA MATRIX INTO CORE
C
      IF (NCYC.GT.0)  GO TO 69
      READ (IUCD,9004) NPGDOF
      NCOL = NDYDOF
      NROW = NPGDOF
      DO 60 I=1,NROW
      DO 55 J=1,NCOL
      ELAM(J,I) = 0.0
   55 CONTINUE
   60 CONTINUE
      ITRIN = 26
      IF (ITRNSF.EQ.2)  ITRIN = 20
      IF (ITRNSF.EQ.0)  GO TO 62
      IF (IDYFLX.EQ.0.AND.IMASS.EQ.0)
     1CALL NASTRD(ITRNSF,ITRIN,1,3,1,NDYDOF,NPGDOF,ELAM(1,1))
      IF (IDYFLX.NE.0.OR.IMASS.NE.0)
     1CALL NASTRD(ITRNSF,ITRIN,2,3,1,NDYDOF,NPGDOF,ELAM(1,1))
      DO 61 I=1,NPGDOF
      CALL NASTRD(ITRNSF,ITRIN,1,3,2,NDYDOF,NPGDOF,ELAM(1,I))
   61 CONTINUE
      IF (ITRNSF.EQ.2)
     1CALL NASTRD(ITRNSF,ITRIN,1,3,3,NDYDOF,NPGDOF,ELAM(1,1))
      GO TO 67
   62 READ (ITRIN,9003) ((IROW(K),ICOL(K),ELAMIN(K)),K=1,3)
      DO 65 K=1,3
      I = IROW(K)
      IF (K.EQ.1.AND.I.EQ.0)  GO TO 66
      IF (I.EQ.0)  GO TO 65
      J = ICOL(K)
      ELAM(J,I) = ELAMIN(K)
   65 CONTINUE
      GO TO 62
   66 WRITE (6,9005) NPGDOF,NDYDOF
      DO 666 J=1,NPGDOF
  666 WRITE (6,9006) J,(ELAM(I,J),I=1,NDYDOF)
   67 CONTINUE
      IFDLTI = 5
      IF (KLUSE.LE.0)  IFDLTI = 2
      CALL PUDLAB (8HFFMASS02,IUDLTI,NAME2,IFDLTI,NROW,NCOL)
      DO 68 I=1,NROW
      CALL PUTROW (IUDLTI,-1,ELAM(1,I),NCOL)
   68 CONTINUE
      CALL DCLOSE (IUDLTI)
      GO TO 72
   69 CONTINUE
      CALL GEDLAB (8HFFMASS02,IUDLTI,NAME,5,NROW,NCOL)
      DO 70 I=1,NROW
      CALL GETROW(IUDLTI,1,ELAM(1,I),NCOL)
   70 CONTINUE
      CALL DCLOSE(IUDLTI)
   72 CONTINUE
```

```
      SUBROUTINE FFMASS(EMAS,ELAM,ELTMD,TPLUG,BUFFER,IDYFLX,IMASS,       FFMASS    2
     1            ITRNSF,IMIN)                                           FFMASS    3
C                                                                        FFMASS    4
C                                                                        FFMASS    5
C THIS SUBROUTINE MODIFIES THE CANTILEVER MASS MATRIX,MD, AND CREATES    FFMASS    6
C A NEW MASS MATRIX,MDFF, FOR FREE-FREE VIBRATION ANALYSIS               FFMASS    7
C                                                                        FFMASS    8
C MDFF = MD-(MD*LAMBDA)*XMI*(LAMBDA(TRAN)*MD)                            FFMASS    9
C WHERE XMI= INVERSE OF (LAMBDA(TRAN)*MD*LAMBDA)+EMP)                    FFMASS   10
C                                                                        FFMASS   11
      DIMENSION EMAS(1),ELAM(220,3),ELTMD(3,220),TPLUG(3,220),BUFFER(1)  FFMASS   12
      DIMENSION         NAME(2),XM(3,3),NR(3),NC(3),WW(3),XMI(3,3)       FFMASS   13
      DIMENSION NAM(2),NAMFFM(2)                                         FFMASS   14
      DIMENSION ELAMIN(3), IROW(3), ICOL(3), NAME2(2)                    FFMASS   15
C                                                                        FFMASS   16
      COMMON /PLACES/ IUIN1,IUIN2,IUOUT1,IUOUT2,IUGO1,IUGO2,IUGO3,IUGO4, FFMASS   17
     1            IUSCR,IFSCR,IFS1,IFS2,IFS3,IFS4,IUCD,IUPR,             FFMASS   18
     2                IUA,IFA,IUY,IFY,IUMEMN,IFMEMN,IUSTFN,IFSTFN,       FFMASS   19
     3                IUKS,IFKS,IUB,IFB,IUDESO,IFDESO,                   FFMASS   20
     4                IUMDBI,IFMDBI,IUADDI,IFADDI,IUBALI,IFBALI,         FFMASS   21
     5                IUDESI,IFDESI,IUWTI,IFWTI,                         FFMASS   22
     6                IUMEMO,IFMEMO,IUBT,IFBT,                           FFMASS   23
     7                IUDESN,IFDESN,IUMD,IFMD,                           FFMASS   24
     8                IUMEMF,IFMEMF,                                     FFMASS   25
     9                IUSTFO,IFSTFO,IUMDB,IFMDB,IUADD,IFADD,IUBAL,IFBAL, FFMASS   26
     A                IUDESF,IFDESF,IUWT,IFWT,                           FFMASS   27
     B                IUDUM1,IFDUM1,IUDUM2,IFDUM2,IUDUM3,IFDUM3,         FFMASS   28
     C                IUL,IFL,IUYT,IFYT,IUZ,IFZ,IUZR,IFZR,IULR,IFLR,     FFMASS   29
     D                IUBR,IFBR,                                         FFMASS   30
     E                IUPHTF,IFPHTF,IUMODM,IFMODM,                       FFMASS   31
     F                IUMODK,IFMODK,IUPHT,IFPHT,IUQT,IFQT,IUQ,IFQ,       FFMASS   32
     G                IUPH,IFPH,IUINCM,IFINCM,IUINCK,IFINCK              FFMASS   33
      COMMON /KLUES / KLUSE,KLUNAL,IRED,KLUMD,KLUBAL,MSADD,NPASS,IDNOPT, FFMASS   34
     1              VDES,EPS1,DWMAX,NBAR,NFIX,D,DEL,EPS2,NCYC,NNN,IBAND, FFMASS   35
     2              IFIN,KLUB,KLUQ,MORBAL,DBAL                           FFMASS   36
      COMMON /PLAYFF/ IUMDFF,IFMDFF,IUDLTI,IFDLTI,IUSLTI,IFSLTI          FFMASS   37
     1               ,IUMPLI,IFMPLI,IUTPGT,IFTPGT,IUPATF,IFPATF          FFMASS   38
     2               ,IUMPL,IFMPL,IUSLT,IFSLT,IUDLT,IFDLT                FFMASS   39
     3               ,IUQA,IFQA,IUQAT,IFQAT,IUPHA,IFPHA,IUPHAT,IFPHAT    FFMASS   40
      COMMON /KLUFF/ KFREE                                               FFMASS   41
      COMMON /PLUG/ EMP(3,3), PHP(3,40)                                  FFMASS   42
      COMMON /CLIST/ KOUNT,KPAGE,LINES,LINEST,KLABEL,KTPAGE,NPAGE        FFMASS   43
     1              ,KBPAGE,LINESG,KOUNTH,KOUNTI                         FFMASS   44
      COMMON /SIZES/ NSTMEM,NSTDOF,NDYDOF,NNOPT,NDESNO,NDESYS            FFMASS   45
      COMMON /CLUEV/ LKLUEV,KLUEV(20)                                    FFMASS   46
C                                                                        FFMASS   47
      DATA NAM /4HTPLU,4HGT  /, NAMFFM/4HMDFF,4H    /                    FFMASS   48
      DATA NAME2 /4HDYNL,4HAMT /                                         FFMASS   49
C                                                                        FFMASS   50
      CALL PROGNA(4H(FFM,4HASS))                                         FFMASS   51
      CALL MESAGE(1,6,6HFFMASS)                                          FFMASS   52
C                                                                        FFMASS   53
C READ LOWER TRIANGLE OF MASS MATRIX (MD) INTO CORE                      FFMASS   54
C                                                                        FFMASS   55
      CALL GEDLAB(8HFFMASS01,IUMD,NAME,IFMD,MROW,MCOL)                   FFMASS   56
      J=1                                                                FFMASS   57
      DO 50 I=1,MROW                                                     FFMASS   58
```

```
LOOPS  LABEL    INDEX      FROM-TO     LENGTH    PROPERTIES
  222  146        J        122 124         2B     INSTACK
  246             K        136 136        11B              EXT REFS
  261  160        J        137 139        25B              EXT REFS  NOT INNER
  270             K        138 138        12B              EXT REFS
  314  220        K        149 152         7B              EXT REFS
  326  250        I        155 168        33B              NOT INNER
  331  240        J        158 167        26B              NOT INNER
  350  230        M        163 166         3B     INSTACK
  367  300        K        173 176        10B              EXT REFS

COMMON BLOCKS    LENGTH     MEMBERS - BIAS NAME(LENGTH)
       CLIST         11                0 KOUNT  (1)             1 KPAGE  (1)              2 LINES  (1)
                                       3 LINEST (1)             4 KLABEL (1)              5 KTPAGE (1)
                                       6 NPAGE  (1)             7 KBPAGE (1)              8 LINESG (1)
                                       9 KOUNTH (1)            10 KOUNTI (1)
       STORES       277                0 NUMSTR (1)             1 KCONST (1)              2 ISTDOF (30)
                                      32 IDYDOF (30)           62 IDSTR  (5)             67 STRWI  (5)
                                      72 STRWO  (5)            77 STRWN  (5)             82 STRII  (15)
                                      97 STRIO  (15)          112 STRIN  (15)           127 STRRI  (15)
                                     142 STRRO  (15)          157 STRRN  (15)           172 STRWDO (5)
                                     177 STRWDN (5)           182 STRIDO (15)           197 STRIDN (15)
                                     212 STRRDO (15)          227 STRRDN (15)           242 SCALE  (35)
       STRCLU        10                0 ICYCLE (1)             1 ISTEP  (1)              2 M1     (1)
                                       3 M2     (1)             4 M3     (1)              5 M4     (1)
                                       6 VS     (1)             7 VOLD   (1)              8 VNEW   (1)
                                       9 STPOLD (1)
       LOCSTR         6                0 IUSTRI (1)             1 IFSTRI (1)              2 IUMREF (1)
                                       3 IFMREF (1)             4 IUMOD  (1)              5 IFMOD  (1)
       COMRWP         3                0 ITAPER (1)             1 ITAPEW (1)              2 ITAPEP (1)

STATISTICS
  PROGRAM LENGTH                 1202B      642
  CM LABELED COMMON LENGTH        463B      307
          52000B CM USED
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VARIABLES     SN  TYPE          RELOCATION
  567  SY          REAL                              REFS       82     2*83      87      94      97    2*98
                                                  DEFINED       64
  570  SZ          REAL                              REFS       81     2*83      85    2*88      96      97
                                                  DEFINED       65
   10  VNEW        REAL                STRCLU        REFS       16
    7  VOLD        REAL                STRCLU        REFS       16
    6  VS          REAL                STRCLU        REFS       16
  562  W           REAL                              REFS       77       78      79      81      82      83      85
                                                       86       87       88      94      95      96      97      98
                                                  DEFINED       59
    0  WORK        REAL         ARRAY     F.P.       REFS        4       45     150     174  DEFINED       1     164
  563  XI          REAL                              REFS       83  DEFINED      60
  564  YI          REAL                              REFS       88  DEFINED      61
  565  ZI          REAL                              REFS       98  DEFINED      62
       VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS            TYPE    ARGS         REFERENCES
       DCLOSE                  1              42       43     153     177
       GEDLAB                  6              35      147
       GETROW                  4              39      150
       MESAGE                  3              28
       PRMAT2                  8              45
       PROGNA                  2              27       49
       PUDLAB                  6              36      170
       PUTROW                  4              40      174
       TITLES                  1             132

STATEMENT LABELS                DEF LINE   REFERENCES
    0  50                           41         38
   47  100                          51         30
    0  120                          69         66       67
    0  140                         103        100      101
    0  144                         114        112
  175  145                         115        108      109
    0  146                         124        122
  225  147                         125        118      119
    0  160                         139        137
    0  200                         141         57
    0  220                         152        149
    0  230                         166        163
    0  240                         167        158
    0  250                         168        155
    0  300                         176        173
  535  9000     FMT                180        134
  543  9001     FMT                181        136
  546  9002     FMT                182        138

LOOPS  LABEL    INDEX      FROM-TO     LENGTH     PROPERTIES
   24  50       I           38 41        12B                EXT REFS
   50  200      I           57 141      240B                EXT REFS  NOT INNER
   64  120      J           66 69        14B                NOT INNER
   72  120      K           67 69         2B       INSTACK
  127  140      J          100 103       21B                NOT INNER
  141  140      K          101 103        3B       INSTACK
  152  145      J          108 115       26B                NOT INNER
  172  144      L          112 114        2B       INSTACK
```

```
VARIABLES      SN  TYPE            RELOCATION
                                                  123     127     136     138     151   2*160    174    175
                                              DEFINED      67     101     107     110     117    120    136
                                                  138     149     159     173
    7  KBPAGE   INTEGER                CLIST     REFS       9
  560  KCOL     INTEGER                          REFS      35      36      39     147     150    170
    1  KCONST   INTEGER                STORES    REFS      11
    4  KLABEL   INTEGER                CLIST     REFS       9
    0  KOUNT    INTEGER                CLIST     REFS       9 DEFINED     131
   11  KOUNTH   INTEGER                CLIST     REFS       9
   12  KOUNTI   INTEGER                CLIST     REFS       9
    1  KPAGE    INTEGER                CLIST     REFS       9
  557  KROW     INTEGER                          REFS      35      36      38     147     149    170    173
    5  KTPAGE   INTEGER                CLIST     REFS       9
  573  L        INTEGER                          REFS   2*113     119     121     123     136    137    138
                                                  164     165 DEFINED     112     118     135    162    165
  576  LF       INTEGER                          REFS     161 DEFINED     160
    2  LINES    INTEGER                CLIST     REFS       9     131
   10  LINESG   INTEGER                CLIST     REFS       9
    3  LINEST   INTEGER                CLIST     REFS       9
  577  LS       INTEGER                          REFS     162 DEFINED     161
  600  M        INTEGER                          REFS     164 DEFINED     163
    2  M1       INTEGER                STRCLU    REFS      16
    3  M2       INTEGER                STRCLU    REFS      16
    4  M3       INTEGER                STRCLU    REFS      16
    5  M4       INTEGER                STRCLU    REFS      16
  574  N        INTEGER                          REFS     150     151     174     175 DEFINED    148    151
                                                  172     175
  601  NAME     INTEGER      ARRAY               REFS       4      35     147
 1067  NAMREF   INTEGER      ARRAY               REFS       4      36 DEFINED      22
 1134  NAMUP    INTEGER      ARRAY               REFS       6     170 DEFINED      21
    0  NCYC     INTEGER                F.P.      REFS      30 DEFINED       1
 1071  NDOF     INTEGER      ARRAY               REFS       5     135     157 DEFINED     127
    6  NPAGE    INTEGER                CLIST     REFS       9
    0  NUMSTR   INTEGER                STORES    REFS      11      57     155
  362  SCALE    REAL         ARRAY     STORES    REFS      11
  603  STM      REAL         ARRAY               REFS       4     102     113     123     138    164
                                              DEFINED      68      77      78      79      81     82     83
                                                   85      86      87      88      94      95     96     97
                                                   98     102     113     123
   11  STPOLD   REAL                   STRCLU    REFS      16
  305  STRIDN   REAL         ARRAY     STORES    REFS      11
  266  STRIDO   REAL         ARRAY     STORES    REFS      11
  122  STRII    REAL         ARRAY     STORES    REFS      11
  160  STRIN    REAL         ARRAY     STORES    REFS      11      60      61      62
  141  STRIO    REAL         ARRAY     STORES    REFS      11
  343  STRRDN   REAL         ARRAY     STORES    REFS      11
  324  STRRDO   REAL         ARRAY     STORES    REFS      11
  177  STRRI    REAL         ARRAY     STORES    REFS      11
  235  STRRN    REAL         ARRAY     STORES    REFS      11      63      64      65
  216  STRRO    REAL         ARRAY     STORES    REFS      11
  261  STRWDN   REAL         ARRAY     STORES    REFS      11
  254  STRWDO   REAL         ARRAY     STORES    REFS      11
  103  STRWI    REAL         ARRAY     STORES    REFS      11
  115  STRWN    REAL         ARRAY     STORES    REFS      11      59
  110  STRWO    REAL         ARRAY     STORES    REFS      11
  566  SX       REAL                             REFS      86      87    2*88      95      96   2*98
                                              DEFINED      63
```

```
            N=1                                                                 MASTOR    173
            DO 300 K=1,KROW                                                     MASTOR    174
            CALL PUTROW(IUMD,1,WORK(N),K)                                       MASTOR    175
            N=N+K                                                               MASTOR    176
        300 CONTINUE                                                            MASTOR    177
            CALL DCLOSE(IUMD)                                                   MASTOR    178
      C                                                                         MASTOR    179
      C                                                                         MASTOR    180
       9000 FORMAT(//,10X,32HNEW MASS MATRIX FOR STORE NUMBER,1X,I4,/)          MASTOR    181
       9001 FORMAT(15X,6(5X,I5,5X))                                             MASTOR    182
       9002 FORMAT(/,10X,I5,1P6E15.5)                                           MASTOR    183
      C                                                                         MASTOR    184
            RETURN                                                              MASTOR    185
            END                                                                 MASTOR    186
```

```
    SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS      DEF LINE      REFERENCES
    3  MASTOR          1         184

VARIABLES       SN  TYPE            RELOCATION
    O  BUFFER       REAL        ARRAY      F.P.        REFS         4        39        40   DEFINED         1
  561  I            INTEGER                            REFS        40        59        60        61        62        63        64
                                                         65        68        77        78        79        81        82        83
                                                         85        86        87        88        94        95        96        97
                                                         98     2*102       109     2*111     2*113       119     2*121     2*123
                                                        127       134       135       136     2*138       157       159       164
                                                    DEFINED        38        57       155
    O  ICYCLE       INTEGER                STRCLU      REFS        16
 1076  IDDOF        INTEGER     ARRAY                  REFS         5       136       138       159   DEFINED       111       121
   76  IDSTR        INTEGER     ARRAY      STORES      REFS        11       134
   40  IDYDOF       INTEGER     ARRAY      STORES      REFS        11       109       111       119       121
    O  IFMD         INTEGER                F.P.        REFS        35       170   DEFINED         1
    5  IFMOD        INTEGER                LOCSTR      REFS        17
    3  IFMREF       INTEGER                LOCSTR      REFS        17        36        45       147
    1  IFSTRI       INTEGER                LOCSTR      REFS        17
    2  ISTDOF       INTEGER     ARRAY      STORES      REFS        11
    1  ISTEP        INTEGER                STRCLU      REFS        16
    2  ITAPEP       INTEGER                COMRWP      REFS        19
    O  ITAPER       INTEGER                COMRWP      REFS        19
    1  ITAPEW       INTEGER                COMRWP      REFS        19        24
    O  IUMD         INTEGER                F.P.        REFS        35        39        42       170       174       177
                                                    DEFINED         1
    4  IUMOD        INTEGER                LOCSTR      REFS        17
    2  IUMREF       INTEGER                LOCSTR      REFS        17        36        40        43        45       147       150
                                                        153
  556  IUPR         INTEGER                            REFS        45   DEFINED        24  I/O REFS       134       136       138
    O  IUSTRI       INTEGER                LOCSTR      REFS        17
  571  J            INTEGER                            REFS        68       101     2*102       109       111       113     2*123
                                                      2*138       159       161       163       164   DEFINED        66       100
                                                        108       122       137       158
  575  JJ           INTEGER                            REFS       158   DEFINED       157
  572  K            INTEGER                            REFS        68     2*102       110       111       113       120       121
```

```
      145 CONTINUE                                                       MASTOR     116
C                                                                        MASTOR     117
          K = O                                                          MASTOR     118
          DO 147 L=1,6                                                   MASTOR     119
          IF (IDYDOF(I,L).EQ.O) GO TO 147                                MASTOR     120
          K = K+ 1                                                       MASTOR     121
          IDDOF(I,K) = IDYDOF(I,L)                                       MASTOR     122
          DO 146  J=1,6                                                  MASTOR     123
          STM (I,J,K) = STM(I,J,L)                                       MASTOR     124
      146 CONTINUE                                                       MASTOR     125
      147 CONTINUE                                                       MASTOR     126
C                                                                        MASTOR     127
          NDOF(I)=K                                                      MASTOR     128
C                                                                        MASTOR     129
C LIST STORE MASS MATRICES.                                              MASTOR     130
C                                                                        MASTOR     131
          KOUNT=LINES                                                    MASTOR     132
          CALL TITLES(2)                                                 MASTOR     133
C                                                                        MASTOR     134
          WRITE(IUPR,9000) IDSTR(I)                                      MASTOR     135
          L=NDOF(I)                                                      MASTOR     136
          WRITE(IUPR,9001) (IDDOF(I,K),K=1,L)                            MASTOR     137
          DO 160 J=1,L                                                   MASTOR     138
          WRITE(IUPR,9002) IDDOF(I,J),(STM(I,J,K),K=1,L)                 MASTOR     139
      160 CONTINUE                                                       MASTOR     140
C                                                                        MASTOR     141
      200 CONTINUE                                                       MASTOR     142
C                                                                        MASTOR     143
C 1. READ REFERENCE MASS MATRIX BACK INTO CORE.                          MASTOR     144
C 2. REPLACE STORE MASS MATRIX BY NEW VALUES                             MASTOR     145
C 3. WRITE UPDATED MASS MATRIX BACK ONTO STANDARD LOCATION.              MASTOR     146
C                                                                        MASTOR     147
          CALL GEDLAB(8HMASTORO2,IUMREF,NAME,IFMREF,KROW,KCOL)           MASTOR     148
          N=1                                                            MASTOR     149
          DO 220 K=1,KROW                                                MASTOR     150
          CALL GETROW(IUMREF,1,WORK(N),KCOL)                             MASTOR     151
          N=N+K                                                          MASTOR     152
      220 CONTINUE                                                       MASTOR     153
          CALL DCLOSE(IUMREF)                                            MASTOR     154
C                                                                        MASTOR     155
          DO 250 I=1,NUMSTR                                              MASTOR     156
C                                                                        MASTOR     157
          JJ=NDOF(I)                                                     MASTOR     158
          DO 240 J=1,JJ                                                  MASTOR     159
          K=IDDOF(I,J)                                                   MASTOR     160
          LF=(K+1)*K/2                                                   MASTOR     161
          LS=LF-J+1                                                      MASTOR     162
          L=LS                                                           MASTOR     163
          DO 230 M=1,J                                                   MASTOR     164
          WORK(L)= STM(I,J,M)                                            MASTOR     165
          L=L+1                                                          MASTOR     166
      230 CONTINUE                                                       MASTOR     167
      240 CONTINUE                                                       MASTOR     168
      250 CONTINUE                                                       MASTOR     169
C                                                                        MASTOR     170
          CALL PUDLAB(8HMASTORO2,IUMD,NAMUP,IFMD,KROW,KCOL)              MASTOR     171
C                                                                        MASTOR     172
```

```
C
      W = STRWN(I)
      XI= STRIN(I,1)
      YI= STRIN(I,2)
      ZI= STRIN(I,3)
      SX= STRRN(I,1)
      SY= STRRN(I,2)
      SZ= STRRN(I,3)
      DO 120 J=1,6
      DO 120 K=1,6
      STM(I,J,K)=0.0
  120 CONTINUE
C
C     CURRENT EQUATIONS FOR STORE MASS MATRIX ARE BASED ON RIGHT-HAND
C     COORDINATE SYSTEM.
C
C     ORIGINAL EQUATIONS, TAKEN FROM GAC REPORT ADCR-80-1, ARE
C     RETAINED AS COMMENTS.
C
      STM(I,1,1)=W
      STM(I,2,2)=W
      STM(I,3,3)=W
C
      STM(I,4,2)=-W*SZ
      STM(I,4,3)= W*SY
      STM(I,4,4)=XI+W*(SY*SY+SZ*SZ)
C
      STM(I,5,1)= W*SZ
      STM(I,5,3)=-W*SX
      STM(I,5,4)=-W*SX*SY
      STM(I,5,5)=YI+W*(SZ*SZ+SX*SX)
C
C     STM(I,6,1)= W*SY
C     STM(I,6,2)=-W*SX
C     STM(I,6,4)= W*SX*SZ
C     STM(I,6,5)= W*SY*SZ
      STM(I,6,1)=-W*SY
      STM(I,6,2)= W*SX
      STM(I,6,4)=-W*SX*SZ
      STM(I,6,5)=-W*SY*SZ
      STM(I,6,6)=ZI+W*(SX*SX+SY*SY)
C
      DO 140 J=1,6
      DO 140 K=1,J
      STM(I,K,J)=STM(I,J,K)
  140 CONTINUE
C
C CONTRACT STORE MASS MATRICES
C
      K=0
      DO 145 J=1,6
      IF(IDYDOF(I,J).EQ.0) GO TO 145
      K=K+1
      IDDOF(I,K)=IDYDOF(I,J)
      DO 144 L=1,6
      STM(I,K,L)=STM(I,J,L)
  144 CONTINUE
```

```
      SUBROUTINE MASTOR(WORK,BUFFER,IUMD,IFMD,NCYC)                     MASTOR   2
C                                                                       MASTOR   3
C                                                                       MASTOR   4
      DIMENSION WORK(1),BUFFER(1),NAME(2),STM(5,6,6),NAMREF(2)          MASTOR   5
      DIMENSION NDUF(5),IDDOF(5,6)                                      MASTOR   6
      DIMENSION NAMUP(2)                                                MASTOR   7
C                                                                       MASTOR   8
C                                                                       MASTOR   9
      COMMON /CLIST/ KOUNT,KPAGE,LINES,LINEST,KLABEL,KTPAGE,NPAGE       MASTOR  10
     1              ,KBPAGE,LINESG,KOUNTH,KOUNTI                        MASTOR  11
      COMMON /STORES/ NUMSTR,KCONST,ISTDOF(5,6),IDYDOF(5,6),IDSTR(5)    MASTOR  12
     A                ,STRWI(5),STRWO(5),STRWN(5),STRII(5,3),STRIO(5,3) MASTOR  13
     B                ,STRIN(5,3),STRRI(5,3),STRRO(5,3),STRRN(5,3)      MASTOR  14
     C                ,STRWDO(5),STRWDN(5),STRIDO(5,3),STRIDN(5,3)      MASTOR  15
     D                ,STRRDO(5,3),STRRDN(5,3),SCALE(5,7)               MASTOR  16
      COMMON /STRCLU/ ICYCLE,ISTEP,M1,M2,M3,M4,VS,VOLD,VNEW,STPOLD      MASTOR  17
      COMMON /LOCSTR/ IUSTRI,IFSTRI,IUMREF,IFMREF                       MASTOR  18
     1                ,IUMOD,IFMOD                                      MASTOR  19
      COMMON /COMRWP/ ITAPER,ITAPEW,ITAPEP                              MASTOR  20
C                                                                       MASTOR  21
      DATA NAMUP /4HUPDA,4HTEMD/                                        MASTOR  22
      DATA NAMREF /4HREF ,4HMASS/                                       MASTOR  23
C                                                                       MASTOR  24
      IUPR=ITAPEW                                                       MASTOR  25
C                                                                       MASTOR  26
C                                                                       MASTOR  27
      CALL PROGNA(4H(MAS,4HTOR))                                        MASTOR  28
      CALL MESAGE(1,6,6HMASTOR)                                         MASTOR  29
C                                                                       MASTOR  30
      IF(NCYC.GT.0) GO TO 100                                           MASTOR  31
C                                                                       MASTOR  32
C TRANSFER REFERENCE DYNAMIC MASS MATRIX TO NEW UNIT. THIS MATRIX DOES  MASTOR  33
C NOT INCLUDE ANY STORE REDESIGN.                                       MASTOR  34
C                                                                       MASTOR  35
      CALL GEDLAB(8HMASTOR01,IUMD,NAME,IFMD,KROW,KCOL)                  MASTOR  36
      CALL PUDLAB(8HMASTOR01,IUMREF,NAMREF,IFMREF,KROW,KCOL)            MASTOR  37
C                                                                       MASTOR  38
      DO 50 I=1,KROW                                                    MASTOR  39
      CALL GETROW(IUMD,1,BUFFER,KCOL)                                   MASTOR  40
      CALL PUTROW(IUMREF,1,BUFFER,I)                                    MASTOR  41
   50 CONTINUE                                                          MASTOR  42
      CALL DCLOSE(IUMD)                                                 MASTOR  43
      CALL DCLOSE(IUMREF)                                               MASTOR  44
C                                                                       MASTOR  45
      CALL PRMAT2(IUMREF,IFMREF,WORK,1,IUPR,4,81,                       MASTOR  46
     1 81H (DYNAMIC MASS MATRIX ENTERING CURRENT FOP RUN - DOES NOT REFL MASTOR  47
     2ECT STORE REDESIGN))                                              MASTOR  48
C                                                                       MASTOR  49
      CALL PROGNA(4H(MAS,4HTOR))                                        MASTOR  50
C                                                                       MASTOR  51
  100 CONTINUE                                                          MASTOR  52
C                                                                       MASTOR  53
C                                                                       MASTOR  54
C                                                                       MASTOR  55
C COMPUTE NEW MASS MATRIX FOR EACH STORE.  (6X6)                        MASTOR  56
C                                                                       MASTOR  57
      DO 200 I=1,NUMSTR                                                 MASTOR  58
```

```
COMMON BLOCKS    LENGTH     MEMBERS - BIAS NAME(LENGTH)
                                     3 NNOPT   (1)            4 NDESNO (1)            5 NDESYS (1)
       FILE          20              0 IPOS    (20)
       WAYTS          6              0 WINITT  (1)            1 WST    (1)            2 WMB    (1)
                                     3 WBOTH   (1)            4 WPRES  (1)            5 DW     (1)
       CLIST         11              0 KOUNT   (1)            1 KPAGE  (1)            2 LINES  (1)
                                     3 LINEST  (1)            4 KLABEL (1)            5 KTPAGE (1)
                                     6 NPAGE   (1)            7 KBPAGE (1)            8 LINESG (1)
                                     9 KOUNTH  (1)           10 KOUNTI (1)
       CLUEV         21              0 LKLUEV  (1)            1 KLUEV  (20)

EQUIV CLASSES    LENGTH     MEMBERS - BIAS NAME(LENGTH)
       PAK           20              0 JPAK    (20)
       ADDMS        550              0 NMS     (1)            1 JCHART (3)            1 CHART  (3)

STATISTICS
  PROGRAM LENGTH               2412B     1290
  CM LABELED COMMON LENGTH      706B      454
         52000B CM USED
```

```
COMMON BLOCKS    LENGTH      MEMBERS - BIAS NAME(LENGTH)
       BAL          241                  0 NMBAL   (1)              1 IDBAL   (20)             21 VMBIN   (20)
                                        41 VMBOLD  (20)            61 VMBNEW  (20)             81 MBDOF   (60)
                                       141 DRVMB   (20)           161 DRVMBO  (20)            181 S1MB    (20)
                                       201 S2MB    (20)           221 S3MB    (20)
       PLACES        98                  0 IUIN1   (1)              1 IUIN2   (1)               2 IUOUT1  (1)
                                         3 IUOUT2  (1)              4 IUGO1   (1)               5 IUGO2   (1)
                                         6 IUGO3   (1)              7 IUGO4   (1)               8 IUSCR   (1)
                                         9 IFSCR   (1)             10 IFS1    (1)              11 IFS2    (1)
                                        12 IFS3    (1)             13 IFS4    (1)              14 IUCD    (1)
                                        15 IUPR    (1)             16 IUA     (1)              17 IFA     (1)
                                        18 IUY     (1)             19 IFY     (1)              20 IUMEMN  (1)
                                        21 IFMEMN  (1)             22 IUSTFN  (1)              23 IFSTFN  (1)
                                        24 IUKS    (1)             25 IFKS    (1)              26 IUB     (1)
                                        27 IFB     (1)             28 IUDESO  (1)              29 IFDESO  (1)
                                        30 IUMDBI  (1)             31 IFMDBI  (1)              32 IUADDI  (1)
                                        33 IFADDI  (1)             34 IUBALI  (1)              35 IFBALI  (1)
                                        36 IUDESI  (1)             37 IFDESI  (1)              38 IUWTI   (1)
                                        39 IFWTI   (1)             40 IUMEMO  (1)              41 IFMEMO  (1)
                                        42 IUBT    (1)             43 IFBT    (1)              44 IUDESN  (1)
                                        45 IFDESN  (1)             46 IUMD    (1)              47 IFMD    (1)
                                        48 IUMEMF  (1)             49 IFMEMF  (1)              50 IUSTFO  (1)
                                        51 IFSTFO  (1)             52 IUMDB   (1)              53 IFMDB   (1)
                                        54 IUADD   (1)             55 IFADD   (1)              56 IUBAL   (1)
                                        57 IFBAL   (1)             58 IUDESF  (1)              59 IFDESF  (1)
                                        60 IUWT    (1)             61 IFWT    (1)              62 IUDUM1  (1)
                                        63 IFDUM1  (1)             64 IUDUM2  (1)              65 IFDUM2  (1)
                                        66 IUDUM3  (1)             67 IFDUM3  (1)              68 IUL     (1)
                                        69 IFL     (1)             70 IUYT    (1)              71 IFYT    (1)
                                        72 IUZ     (1)             73 IFZ     (1)              74 IUZR    (1)
                                        75 IFZR    (1)             76 IULR    (1)              77 IFLR    (1)
                                        78 IUBR    (1)             79 IFBR    (1)              80 IUPHTF  (1)
                                        81 IFPHTF  (1)             82 IUMODM  (1)              83 IFMODM  (1)
                                        84 IUMODK  (1)             85 IFMODK  (1)              86 IUPHT   (1)
                                        87 IFPHT   (1)             88 IUQT    (1)              89 IFQT    (1)
                                        90 IUQ     (1)             91 IFQ     (1)              92 IUPH    (1)
                                        93 IFPH    (1)             94 IUINCM  (1)              95 IFINCM  (1)
                                        96 IUINCK  (1)             97 IFINCK  (1)
       PLAYFF        26                  0 IUMDFF  (1)              1 IFMDFF  (1)               2 IUDLTI  (1)
                                         3 IFDLTI  (1)              4 IUSLTI  (1)               5 IFSLTI  (1)
                                         6 IUMPLI  (1)              7 IFMPLI  (1)               8 IUTPGT  (1)
                                         9 IFTPGT  (1)             10 IUPATF  (1)              11 IFPATF  (1)
                                        12 IUMPL   (1)             13 IFMPL   (1)              14 IUSLT   (1)
                                        15 IFSLT   (1)             16 IUDLT   (1)              17 IFDLT   (1)
                                        18 IUQA    (1)             19 IFQA    (1)              20 IUQAT   (1)
                                        21 IFQAT   (1)             22 IUPHA   (1)              23 IFPHA   (1)
                                        24 IUPHAT  (1)             25 IFPHAT  (1)
       KLUES         24                  0 KLUSE   (1)              1 KLUNAL  (1)               2 IRED    (1)
                                         3 KLUMD   (1)              4 KLUBAL  (1)               5 MSADD   (1)
                                         6 NPASS   (1)              7 IDNOPT  (1)               8 VDES    (1)
                                         9 EPS1    (1)             10 DWMAX   (1)              11 NBAR    (1)
                                        12 NFIX    (1)             13 D       (1)              14 DEL     (1)
                                        15 EPS2    (1)             16 NCYC    (1)              17 NNN     (1)
                                        18 IBAND   (1)             19 IFIN    (1)              20 KLUB    (1)
                                        21 KLUQ    (1)             22 MORBAL  (1)              23 DBAL    (1)
       KLUFF          1                  0 KFREE   (1)
       SIZES          6                  0 NSTMEM  (1)              1 NSTDOF  (1)               2 NDYDOF  (1)
```

```
EXTERNALS          TYPE   ARGS       REFERENCES
      PUTROW                4           163       164       177       178
      TIMEB                 2            56       746
      TITLES                1           205

STATEMENT LABELS                DEF LINE    REFERENCES
   32  60                          105         100
   54  70                          116         109
    0  80                          124         123
   77  85                          130         154
    0  90                          135         133
  125  100                         137         134
  126  110                         139         128
    0  115          INACTIVE       142         140
    0  120                         151         139
  146  130                         156         140
  163  140                         161         125
  167  150                         162         160
    0  160                         168         120
  214  170                         173         137
  240  180                         179         172
  247  210                         184         140
  251  212                         196         156
  253  213                         198         157       174
  255  214                         200         173
  256  220                         202         185       197       199
  643  9001     FMT                658         130
  646  9002     FMT  NO REFS       659
  650  9003     FMT  NO REFS       660
  663  9004     FMT                663         206
  730  9005     FMT  NO REFS       672
  746  9006     FMT  NO REFS       675
  751  9007     FMT  NO REFS       676
  763  9008     FMT  NO REFS       678
  766  9009     FMT  NO REFS       679
  777  9010     FMT  NO REFS       681
 1014  9011     FMT  NO REFS       684
 1037  9012     FMT  NO REFS       689
 1061  9013     FMT  NO REFS       693
 1075  9014     FMT  NO REFS       696
 1103  9015     FMT                697         117
 1117  9016     FMT                700         158       175
  320  9940                        714         708
  345  9950                        728         721
  356  9970                        736         732
  362  9980                        739         733       734
  365  9990                        742         730       738
  301  9999                        703          61       182       209

LOOPS  LABEL    INDEX     FROM-TO     LENGTH    PROPERTIES
   64  160      I         120 168      120B               EXT REFS    EXITS   NOT INNER
   71  80       J         123 124       2B      INSTACK
  102           K         130 130      12B                EXT REFS
  120  90       K         133 135       5B      INSTACK     EXITS
  130  120      K         139 151      15B        OPT       EXITS
  265           M         206 206      12B                EXT REFS
```

```
VARIABLES      SN  TYPE           RELOCATION
  2263  NAME       INTEGER   *UNDEF                REFS        5
  2265  NAMMD      INTEGER    ARRAY                REFS        5       99   DEFINED       50
  2267  NAMMDB     INTEGER    ARRAY                REFS        5      102       103  DEFINED       50
  2277  NAMMS      INTEGER    ARRAY                REFS        6  DEFINED        50
    13  NBAR       INTEGER            KLUES        REFS       39
  2255  NC         INTEGER    ARRAY                REFS        4      142       206  DEFINED      130
  1147  NCARD      INTEGER                         REFS      135      137       139  DEFINED      132       135
  1155  NCIC       INTEGER                         REFS      712  DEFINED       711
    20  NCYC       INTEGER            KLUES        REFS       39       61       711
     4  NDESNO     INTEGER            SIZES        REFS       43
     5  NDESYS     INTEGER            SIZES        REFS       43
     2  NDYDOF     .NTEGER            SIZES        REFS       43     2*99     2*102    2*103    2*110    2*112    2*117
                                                    120    2*161    2*170       173
    14  NFIX       INTEGER            KLUES        REFS       39
     0  NMBAL      INTEGER            BAL          REFS       15
  1204  NMS        INTEGER   *UNDEF                REFS       12
    21  NNN        INTEGER            KLUES        REFS       39
     3  NNOPT      INTEGER            SIZES        REFS       43
     6  NPAGE      INTEGER            CLIST        REFS       46
     6  NPASS      INTEGER            KLUES        REFS       39      734
  2252  NR         INTEGER    ARRAY                REFS        4      134       140      156      206
                                                DEFINED      130
     1  NSTDOF     INTEGER            SIZES        REFS       43
     0  NSTMEM     INTEGER            SIZES        REFS       43
  2301  NUMB       INTEGER   *UNDEF                REFS       10
  1160  PAK        REAL      *UNDEF                REFS        9       13
   265  S1MB       REAL       ARRAY   BAL          REFS       15
   311  S2MB       REAL       ARRAY   BAL          REFS       15
   335  S3MB       REAL       ARRAY   BAL          REFS       15
  2313  VALUE      REAL      *UNDEF                REFS       10
    10  VDES       REAL               KLUES        REFS       39
    25  VMBIN      REAL       ARRAY   BAL          REFS       15
    75  VMBNEW     REAL       ARRAY   BAL          REFS       15
    51  VMBOLD     REAL       ARRAY   BAL          REFS       15
     3  WBOTH      REAL               WAYTS        REFS       45
     0  WINITT     REAL               WAYTS        REFS       45
     2  WMB        REAL               WAYTS        REFS       45
     0  WORK       REAL       ARRAY    F.P.        REFS        4      712     4*722      736      739
                                                DEFINED        1
     4  WPRES      REAL               WAYTS        REFS       45
     1  WST        REAL               WAYTS        REFS       45
  2260  WW         REAL       ARRAY                REFS        4      149       206  DEFINED      130

FILE NAMES         MODE
       TAPE6       FMT                 WRITES      117      158      175
       VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS            TYPE    ARGS        REFERENCES
       DCLOSE                  1            179      180
       FFMASS                  9            722
       MASTOR                  5            712
       MESAGE                  3             55      747
       NASTRD                  8            110      112      161      170
       PRMAT1                  8            736
       PRMAT2                  8            739
       PROGNA                  2             54      713      724      745
       PUDLAB                  6             99      102      103
```

```
      IF(NCARD.GT O) GO TO 105                                          FFMASS  173
  112 CONTINUE                                                          FFMASS  174
C                                                                       FFMASS  175
      KOUNT=LINES                                                       FFMASS  176
      CALL TITLES(2)                                                    FFMASS  177
      WRITE(IUPR,9001)                                                  FFMASS  178
      KOUNT=KOUNT+5                                                     FFMASS  179
      DO 115 I=1,LCOL                                                   FFMASS  180
      WRITE(IUPR,9002) (I,J,EMP(I,J),J=1,LCOL)                          FFMASS  181
      KOUNT=KOUNT+2                                                     FFMASS  182
  115 CONTINUE                                                          FFMASS  183
C                                                                       FFMASS  184
      GO TO 130                                                         FFMASS  185
C                                                                       FFMASS  186
  120 CONTINUE                                                          FFMASS  187
      CALL GEDLAB(8HFFMASSO3,IUMPLI,NAME,IFMPLI,KROW,KCOL)              FFMASS  188
      NBYTE=(3*3)*4                                                     FFMASS  189
      CALL DREAD(IUMPLI,EMP(1,1),NBYTE)                                 FFMASS  190
      CALL DCLOSE(IUMPLI)                                               FFMASS  191
C                                                                       FFMASS  192
  130 CONTINUE                                                          FFMASS  193
C                                                                       FFMASS  194
C ADD (EMP) TO (XM) AND INVERT THE RESULT. STORE RESULT IN XMI.         FFMASS  195
C                                                                       FFMASS  196
      DO 140 I=1,3                                                      FFMASS  197
      DO 140 J=1,3                                                      FFMASS  198
  140 XM(I,J)=XM(I,J)+EMP(I,J)                                          FFMASS  199
C                                                                       FFMASS  200
      CALL IV33(XM,XMI)                                                 FFMASS  201
C                                                                       FFMASS  202
C FORM THE PRODUCT OF XMI AND LAMBDA(TRAN)*MD. STORE RESULT IN TPLUG.   FFMASS  203
C ALSO, STORE TPLUG(TRAN) ON I/O UNIT                                   FFMASS  204
C                                                                       FFMASS  205
      DO 150 I=1,LCOL                                                   FFMASS  206
      DO 150 K=1,MCOL                                                   FFMASS  207
      A=0.0                                                             FFMASS  208
      DO 145 J=1,LCOL                                                   FFMASS  209
      A=A+XMI(I,J)*ELTMD(J,K)                                           FFMASS  210
  145 CONTINUE                                                          FFMASS  211
      TPLUG(I,K)=A                                                      FFMASS  212
  150 CONTINUE                                                          FFMASS  213
C                                                                       FFMASS  214
      CALL PUDLAB(8HFFMASSO1,IUTPGT,NAM,IFTPGT,MCOL,LCOL)               FFMASS  215
      DO 160 K=1,MCOL                                                   FFMASS  216
      CALL PUTROW(IUTPGT,2,TPLUG(1,K),LCOL)                             FFMASS  217
  160 CONTINUE                                                          FFMASS  218
      CALL DCLOSE(IUTPGT)                                               FFMASS  219
C                                                                       FFMASS  220
C FORM FREE-FREE MASS MATRIX (MDFF) AND STORE LOWER TRIANGLE ON I/O UNIT FFMASS  221
C                                                                       FFMASS  222
      CALL PUDLAB(8HFFMASSO2,IUMDFF,NAMFFM,IFMDFF,MROW,MCOL)            FFMASS  223
      DO 190 I=1,MCOL                                                   FFMASS  224
      DO 180 K=1,I                                                      FFMASS  225
      L=((I-1)*I/2)+K                                                   FFMASS  226
      A=0.0                                                             FFMASS  227
      DO 170 J=1,LCOL                                                   FFMASS  228
      A=A+ELTMD(J,I)*TPLUG(J,K)                                         FFMASS  229
```

```
          170 CONTINUE                                                          FFMASS    230
              BUFFER(K)=EMAS(L)-A                                               FFMASS    231
          180 CONTINUE                                                          FFMASS    232
              CALL PUTROW(IUMDFF,1,BUFFER,I)                                    FFMASS    233
          190 CONTINUE                                                          FFMASS    234
              CALL DCLOSE(IUMDFF)                                               FFMASS    235
        C                                                                       FFMASS    236
        C                                                                       FFMASS    237
         9000 FORMAT(3(2I4,E15.5,1X))                                           FFMASS    238
         9001 FORMAT(/,10X,    16HPLUG MASS MATRIX,                             FFMASS    239
             1       //,10X, 3(25H  ROW  COL          VALUE,5X),/)              FFMASS    240
         9002 FORMAT(/,10X,3(2I5,1PE15.5,5X))                                   FFMASS    241
         9003 FORMAT (3(2I4,1PE15.5,1X))                                        FFMASS    242
         9004 FORMAT (4I5)                                                      FFMASS    243
         9005 FORMAT (1H1,9X,8HREADING ,I3,3H X ,I3,                            FFMASS    244
             1          52H RIGID-BODY-DISPLACEMENT MATRIX FROM CARD-IMAGE FILE) FFMASS    245
         9006 FORMAT (//15X,4HROW ,I3//(1P10E12.4))                             FFMASS    246
        C                                                                       FFMASS    247
              RETURN                                                            FFMASS    248
              END                                                               FFMASS    249
```

```
     SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS       DEF LINE      REFERENCES
    3  FFMASS           1          247

VARIABLES        SN  TYPE             RELOCATION
 1175  A             REAL                             REFS       126       128       141       143       209       211       228
                                                        230   DEFINED       122       126       139       141       207       209
                                                        226       228
    0  BUFFER        REAL        ARRAY      F.P.      REFS        11       232   DEFINED         1       230
   15  D             REAL                   KLUES     REFS        33
   27  DBAL          REAL                   KLUES     REFS        33
   16  DEL           REAL                   KLUES     REFS        33
   12  DWMAX         REAL                   KLUES     REFS        33
    0  ELAM          REAL        ARRAY      F.P.      REFS        11        77        79        82        84        98       104
                                                        111       126       141   DEFINED         1        71        93
 1244  ELAMIN        REAL        ARRAY                REFS        14        93   DEFINED        87
    0  ELTMD         REAL        ARRAY      F.P.      REFS        11       141       209       228   DEFINED         1       128
    0  EMAS          REAL        ARRAY      F.P.      REFS        11        58       126       230   DEFINED         1
    0  EMP           REAL        ARRAY      PLUG      REFS        41       159       161       180       189       198
                                                    DEFINED       152       153       168       169
   11  EPS1          REAL                   KLUES     REFS        33
   17  EPS2          REAL                   KLUES     REFS        33
 1165  I             INTEGER                          REFS        59        71        82        90        91        93        98
                                                        104       111       126       128       135       141       143       152
                                                      2*153       161     2*180     3*198       209       211       224     2*225
                                                        228       232   DEFINED        57        69        81        89        98
                                                        103       110       120       133       137       150       160       179
                                                        196       205       223
   22  IBAND         INTEGER                KLUES     REFS        33
 1252  ICOL          INTEGER     ARRAY                REFS        14        92   DEFINED        87
    7  IDNOPT        INTEGER                KLUES     REFS        33
```

```
VARIABLES      SN  TYPE             RELOCATION
     0  IDYFLX     INTEGER             F.P.      REFS      77       79   DEFINED       1
    21  IFA        INTEGER            PLACES     REFS      16
    67  IFADD      INTEGER            PLACES     REFS      16
    41  IFADDI     INTEGER            PLACES     REFS      16
    33  IFB        INTEGER            PLACES     REFS      16
    71  IFBAL      INTEGER            PLACES     REFS      16
    43  IFBALI     INTEGER            PLACES     REFS      16
   117  IFBR       INTEGER            PLACES     REFS      16
    53  IFBT       INTEGER            PLACES     REFS      16
    73  IFDESF     INTEGER            PLACES     REFS      16
    45  IFDESI     INTEGER            PLACES     REFS      16
    55  IFDESN     INTEGER            PLACES     REFS      16
    35  IFDESO     INTEGER            PLACES     REFS      16
    21  IFDLT      INTEGER            PLAYFF     REFS      36
     3  IFDLTI     INTEGER            PLAYFF     REFS      36      102   DEFINED     100       101
    77  IFDUM1     INTEGER            PLACES     REFS      16
   101  IFDUM2     INTEGER            PLACES     REFS      16
   103  IFDUM3     INTEGER            PLACES     REFS      16
    23  IFIN       INTEGER            KLUES      REFS      33
   141  IFINCK     INTEGER            PLACES     REFS      16
   137  IFINCM     INTEGER            PLACES     REFS      16
    31  IFKS       INTEGER            PLACES     REFS      16
   105  IFL        INTEGER            PLACES     REFS      16
   115  IFLR       INTEGER            PLACES     REFS      16
    57  IFMD       INTEGER            PLACES     REFS      16       55
    65  IFMDB      INTEGER            PLACES     REFS      16
    37  IFMDBI     INTEGER            PLACES     REFS      16
     1  IFMDFF     INTEGER            PLAYFF     REFS      36      222
    61  IFMEMF     INTEGER            PLACES     REFS      16
    25  IFMEMN     INTEGER            PLACES     REFS      16
    51  IFMEMO     INTEGER            PLACES     REFS      16
   125  IFMODK     INTEGER            PLACES     REFS      16
   123  IFMODM     INTEGER            PLACES     REFS      16
    15  IFMPL      INTEGER            PLAYFF     REFS      36
     7  IFMPLI     INTEGER            PLAYFF     REFS      36      187
    13  IFPATF     INTEGER            PLAYFF     REFS      36
   135  IFPH       INTEGER            PLACES     REFS      16
    27  IFPHA      INTEGER            PLAYFF     REFS      36
    31  IFPHAT     INTEGER            PLAYFF     REFS      36
   127  IFPHT      INTEGER            PLACES     REFS      16
   121  IFPHTF     INTEGER            PLACES     REFS      16
   133  IFQ        INTEGER            PLACES     REFS      16
    23  IFQA       INTEGER            PLAYFF     REFS      36
    25  IFQAT      INTEGER            PLAYFF     REFS      36
   131  IFQT       INTEGER            PLACES     REFS      16
    11  IFSCR      INTEGER            PLACES     REFS      16
    17  IFSLT      INTEGER            PLAYFF     REFS      36
     5  IFSLTI     INTEGER            PLAYFF     REFS      36
    27  IFSTFN     INTEGER            PLACES     REFS      16
    63  IFSTFO     INTEGER            PLACES     REFS      16
    12  IFS1       INTEGER            PLACES     REFS      16
    13  IFS2       INTEGER            PLACES     REFS      16
    14  IFS3       INTEGER            PLACES     REFS      16
    15  IFS4       INTEGER            PLACES     REFS      16
    11  IFTPGT     INTEGER            PLAYFF     REFS      36      214
    75  IFWT       INTEGER            PLACES     REFS      16
```

```
VARIABLES     SN  TYPE           RELOCATION
   23  IFY         INTEGER            PLACES     REFS       16
  107  IFYT        INTEGER            PLACES     REFS       16
  111  IFZ         INTEGER            PLACES     REFS       16
  113  IFZR        INTEGER            PLACES     REFS       16
    0  IMASS       INTEGER              F.P.     REFS       77       79      158      159      161
                                              DEFINED        1
    0  IMIN        INTEGER              F.P.     REFS      159      161  DEFINED        1  I/O REFS     164
    2  IRED        INTEGER             KLUES     REFS       33
 1247  IROW        INTEGER      ARRAY            REFS       14       89  DEFINED       87
 1171  ITRIN       INTEGER                       REFS       77       79       82       84  DEFINED      74       75
                                              I/O REFS      87
    0  ITRNSF      INTEGER              F.P.     REFS       75       76       77       79       82    2*84
                                              DEFINED        1
   20  IUA         INTEGER            PLACES     REFS       16
   66  IUADD       INTEGER            PLACES     REFS       16
   40  IUADDI      INTEGER            PLACES     REFS       16
   32  IUB         INTEGER            PLACES     REFS       16
   70  IUBAL       INTEGER            PLACES     REFS       16
   42  IUBALI      INTEGER            PLACES     REFS       16
  116  IUBR        INTEGER            PLACES     REFS       16
   52  IUBT        INTEGER            PLACES     REFS       16
   16  IUCD        INTEGER            PLACES     REFS       16  I/O REFS       66
   72  IUDESF      INTEGER            PLACES     REFS       16
   44  IUDESI      INTEGER            PLACES     REFS       16
   54  IUDESN      INTEGER            PLACES     REFS       16
   34  IUDESO      INTEGER            PLACES     REFS       16
   20  IUDLT       INTEGER            PLAYFF     REFS       36
    2  IUDLTI      INTEGER            PLAYFF     REFS       36      102      104      106      109     111      113
   76  IUDUM1      INTEGER            PLACES     REFS       16
  100  IUDUM2      INTEGER            PLACES     REFS       16
  102  IUDUM3      INTEGER            PLACES     REFS       16
    4  IUGO1       INTEGER            PLACES     REFS       16
    5  IUGO2       INTEGER            PLACES     REFS       16
    6  IUGO3       INTEGER            PLACES     REFS       16
    7  IUGO4       INTEGER            PLACES     REFS       16
  140  IUINCK      INTEGER            PLACES     REFS       16
  136  IUINCM      INTEGER            PLACES     REFS       16
    0  IUIN1       INTEGER            PLACES     REFS       16
    1  IUIN2       INTEGER            PLACES     REFS       16
   30  IUKS        INTEGER            PLACES     REFS       16
  104  IUL         INTEGER            PLACES     REFS       16
  114  IULR        INTEGER            PLACES     REFS       16
   56  IUMD        INTEGER            PLACES     REFS       16       55       58       61
   64  IUMDB       INTEGER            PLACES     REFS       16
   36  IUMDBI      INTEGER            PLACES     REFS       16
    0  IUMDFF      INTEGER            PLAYFF     REFS       36      222      232      234
   60  IUMEMF      INTEGER            PLACES     REFS       16
   24  IUMEMN      INTEGER            PLACES     REFS       16
   50  IUMEMO      INTEGER            PLACES     REFS       16
  124  IUMODK      INTEGER            PLACES     REFS       16
  122  IUMODM      INTEGER            PLACES     REFS       16
   14  IUMPL       INTEGER            PLAYFF     REFS       36
    6  IUMPLI      INTEGER            PLAYFF     REFS       36      187      189      190
    2  IUOUT1      INTEGER            PLACES     REFS       16
    3  IUOUT2      INTEGER            PLACES     REFS       16
   12  IUPATF      INTEGER            PLAYFF     REFS       36
  134  IUPH        INTEGER            PLACES     REFS       16
```

```
VARIABLES      SN  TYPE            RELOCATION
    26  IUPHA      INTEGER              PLAYFF      REFS       36
    30  IUPHAT     INTEGER              PLAYFF      REFS       36
   126  IUPHT      INTEGER              PLACES      REFS       16
   120  IUPHTF     INTEGER              PLACES      REFS       16
    17  IUPR       INTEGER              PLACES      REFS       16  I/O REFS      177       180
   132  IUQ        INTEGER              PLACES      REFS       16
    22  IUQA       INTEGER              PLAYFF      REFS       36
    24  IUQAT      INTEGER              PLAYFF      REFS       36
   130  IUQT       INTEGER              PLACES      REFS       16
    10  IUSCR      INTEGER              PLACES      REFS       16
    16  IUSLT      INTEGER              PLAYFF      REFS       36
     4  IUSLTI     INTEGER              PLAYFF      REFS       36
    26  IUSTFN     INTEGER              PLACES      REFS       16
    62  IUSTFO     INTEGER              PLACES      REFS       16
    10  IUTPGT     INTEGER              PLAYFF      REFS       36       214       216       218
    74  IUWT       INTEGER              PLACES      REFS       16
    46  IUWTI      INTEGER              PLACES      REFS       16
    22  IUY        INTEGER              PLACES      REFS       16
   106  IUYT       INTEGER              PLACES      REFS       16
   110  IUZ        INTEGER              PLACES      REFS       16
   112  IUZR       INTEGER              PLACES      REFS       16
  1164  J          INTEGER                          REFS       58        59        71        93      2*98     3*124     2*125
                                                     126      135     2*141       152     2*153     2*180     3*198     2*209
                                                   2*228  DEFINED        56        59        70        92        97       123
                                                     134      140       151       180       197       208       227
  1172  K          INTEGER                          REFS     3*87        89        90        92        93     2*124     3*125
                                                     128      141       143     3*164       167     3*168     3*169       209
                                                     211      216       225       228       230   DEFINED        87        88
                                                     121      138       164       166       206       215       224
     7  KBPAGE     INTEGER              CLIST       REFS       42
  1201  KCOL     * INTEGER                          REFS      187
     0  KFREE      INTEGER              KLUFF       REFS       40
     4  KLABEL     INTEGER              CLIST       REFS       42
    24  KLUB       INTEGER              KLUES       REFS       33
     4  KLUBAL     INTEGER              KLUES       REFS       33
     1  KLUEV      INTEGER     ARRAY    CLUEV       REFS       45
     3  KLUMD      INTEGER              KLUES       REFS       33
     1  KLUNAL     INTEGER              KLUES       REFS       33
    25  KLUQ       INTEGER              KLUES       REFS       33
     0  KLUSE      INTEGER              KLUES       REFS       33       101
     0  KOUNT      INTEGER              CLIST       REFS       42       178       181   DEFINED       175       178       181
    11  KOUNTH     INTEGER              CLIST       REFS       42
    12  KOUNTI     INTEGER              CLIST       REFS       42
     1  KPAGE      INTEGER              CLIST       REFS       42
  1200  KROW     * INTEGER                          REFS      187
     5  KTPAGE     INTEGER              CLIST       REFS       42
  1176  L          INTEGER                          REFS      126       230   DEFINED       124       125       225
  1174  LCOL       INTEGER                          REFS      120       137       138       179       180       205       208
                                                     214      216       227   DEFINED       119
     2  LINES      INTEGER              CLIST       REFS       42       175
    10  LINESG     INTEGER              CLIST       REFS       42
     3  LINEST     INTEGER              CLIST       REFS       42
     0  LKLUEV     INTEGER              CLUEV       REFS       45
  1173  LROW       INTEGER                          REFS      123       140   DEFINED       118
  1163  MCOL       INTEGER                          REFS       55        58       121       206       214       215       222
                                                     223
    26  MORBAL     INTEGER              KLUES       REFS       33
```

```
VARIABLES      SN  TYPE          RELOCATION
 1162  MROW        INTEGER                           REFS       55     57    222
    5  MSADD       INTEGER               KLUES       REFS       33
 1240  NAM         INTEGER     ARRAY                 REFS       13    214  DEFINED     47
 1203  NAME        INTEGER     ARRAY                 REFS       12     55    109    187
 1255  NAME2       INTEGER     ARRAY                 REFS       14    102  DEFINED     48
 1242  NAMFFM      INTEGER     ARRAY                 REFS       13    222  DEFINED     47
   13  NBAR        INTEGER               KLUES       REFS       33
 1202  NBYTE       INTEGER                           REFS      189  DEFINED    188
 1221  NC          INTEGER     ARRAY                 REFS       12    168    169  DEFINED    164
 1177  NCARD       INTEGER                           REFS      170    172  DEFINED    165    170
 1167  NCOL        INTEGER                           REFS       70    102    104    109    111    118
                                                   DEFINED      67
   20  NCYC        INTEGER               KLUES       REFS       33     65    145
    4  NDESNO      INTEGER               SIZES       REFS       44
    5  NDESYS      INTEGER               SIZES       REFS       44
    2  NDYDOF      INTEGER               SIZES       REFS       44     67     77     79     82     84     96
                                                      98
   14  NFIX        INTEGER               KLUES       REFS       33
   21  NNN         INTEGER               KLUES       REFS       33
    3  NNOPT       INTEGER               SIZES       REFS       44
    6  NPAGE       INTEGER               CLIST       REFS       42
    6  NPASS       INTEGER               KLUES       REFS       33    156
 1166  NPGDOF      INTEGER                           REFS       68     77     79     81     82     84     96
                                                      97  2*159    160  2*161  DEFINED     66
 1216  NR          INTEGER     ARRAY                 REFS       12    167    168    169  DEFINED    164
 1170  NROW        INTEGER                           REFS       69    102    103    109    110    119
                                                   DEFINED      68
    1  NSTDOF      INTEGER               SIZES       REFS       44
    0  NSTMEM      INTEGER               SIZES       REFS       44
   11  PHP         REAL        ARRAY     PLUG        REFS       41
    0  TPLUG       REAL        ARRAY      F.P.       REFS       11    216    228  DEFINED      1    211
   10  VDES        REAL                  KLUES       REFS       33
 1224  WW          REAL        ARRAY                 REFS       12    168    169  DEFINED    164
 1205  XM          REAL        ARRAY                 REFS       12    198    200  DEFINED    135    143    198
 1227  XMI         REAL        ARRAY                 REFS       12    200    209

FILE NAMES         MODE
       TAPE6       FMT                    WRITES       96     98
       VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS            TYPE    ARGS        REFERENCES
       DCLOSE                   1            61       106    113    190    218    234
       DREAD                    3           189
       GEDLAB                   6            55       109    187
       GETROW                   4            58       111
       IV33                     2           200
       MESAGE                   3            51
       NASTRD                   8            77        79     82     84    159    161
       PROGNA                   2            50
       PUDLAB                   6           102       214    222
       PUTROW                   4           104       216    232
       TITLES                   1           176

STATEMENT LABELS              DEF LINE    REFERENCES
    0  50                        60          57
    0  55                        72          70
    0  60                        73          69
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STATEMENT LABELS                DEF LINE   REFERENCES
    0  61                          83        81
  116  62                          87        76        95
  147  65                          94        88        91
  152  66                          96        90
  167  67                          99        86
    0  68                         105       103
  210  69                         108        65
    0  70                         112       110
  223  72                         114       107
    0  75                         127       123
    0  80                         129       120       121
    0  82                         135       133       134
    0  85                         142       140
    0  90                         144       137       138
    0  100                        154       150       151
    0  102                        162       160
  372  105                        164       158       172
  424  110                        171       166       167
  427  112                        173       163
    0  115                        182       179
  460  120                        186       156
  467  130                        192       145       184
    0  140                        198       196       197
    0  145                        210       208
    0  150                        212       205       206
    0  160                        217       215
    0  170                        229       227
    0  180                        231       224
    0  190                        233       223
    0  666                         98        97
 1111  9000    FMT                237       164
 1114  9001    FMT                238       177
 1124  9002    FMT                240       180
 1130  9003    FMT                241        87
 1133  9004    FMT                242        66
 1135  9005    FMT                243        96
 1147  9006    FMT                245        98

LOOPS  LABEL    INDEX    FROM-TO    LENGTH    PROPERTIES
   16  50       I         57  60       7B               EXT REFS
   36  60       I         69  73      12B               NOT INNER
   43  55       J         70  72       2B      INSTACK
   77  61       I         81  83      10B               EXT REFS
  121           K         87  87      12B               EXT REFS
  135  65       K         88  94      15B        OPT      EXITS
  155  666      J         97  98      12B               EXT REFS
  176  68       I        103 105      10B               EXT REFS
  213  70       I        110 112       7B               EXT REFS
  227  80       I        120 129      37B               NOT INNER
  230  80       K        121 129      33B               NOT INNER
  241  75       J        123 127      14B        OPT
  267  82       I        133 135      13B               NOT INNER
  274  82       J        134 135       2B      INSTACK
  303  90       I        137 144      27B               NOT INNER
  304  90       K        138 144      23B               NOT INNER
  315  85       J        140 142       4B      INSTACK
```

```
LOOPS  LABEL    INDEX     FROM-TO    LENGTH   PROPERTIES
  341  100      J         151 154        5B    INSTACK
  361  102      I         160 162       11B              EXT REFS
  375           K         164 164       12B              EXT REFS
  415  110      K         166 171       10B       OPT
  437  115      I         179 182       20B              EXT REFS  NOT INNER
  442           J         180 180       10B              EXT REFS
  470  140      I         196 198       14B              NOT INNER
  475  140      J         197 198        3B    INSTACK
  506  150      I         205 212       27B              NOT INNER
  507  150      K         206 212       23B              NOT INNER
  520  145      J         208 210        4B    INSTACK
  537  160      K         215 217        7B              EXT REFS
  552  190      I         223 233       34B              EXT REFS  NOT INNER
  553  180      K         224 231       26B              NOT INNER
  567  170      J         227 229        4B    INSTACK

COMMON BLOCKS   LENGTH     MEMBERS - BIAS NAME(LENGTH)
       PLACES       98              0 IUIN1  (1)            1 IUIN2  (1)            2 IUOUT1 (1)
                                    3 IUOUT2 (1)            4 IUGO1  (1)            5 IUGO2  (1)
                                    6 IUGO3  (1)            7 IUGO4  (1)            8 IUSCR  (1)
                                    9 IFSCR  (1)           10 IFS1   (1)           11 IFS2   (1)
                                   12 IFS3   (1)           13 IFS4   (1)           14 IUCD   (1)
                                   15 IUPR   (1)           16 IUA    (1)           17 IFA    (1)
                                   18 IUY    (1)           19 IFY    (1)           20 IUMEMN (1)
                                   21 IFMEMN (1)           22 IUSTFN (1)           23 IFSTFN (1)
                                   24 IUKS   (1)           25 IFKS   (1)           26 IUB    (1)
                                   27 IFB    (1)           28 IUDESO (1)           29 IFDESO (1)
                                   30 IUMDBI (1)           31 IFMDBI (1)           32 IUADDI (1)
                                   33 IFADDI (1)           34 IUBALI (1)           35 IFBALI (1)
                                   36 IUDESI (1)           37 IFDESI (1)           38 IUWTI  (1)
                                   39 IFWTI  (1)           40 IUMEMO (1)           41 IFMEMO (1)
                                   42 IUBT   (1)           43 IFBT   (1)           44 IUDESN (1)
                                   45 IFDESN (1)           46 IUMD   (1)           47 IFMD   (1)
                                   48 IUMEMF (1)           49 IFMEMF (1)           50 IUSTFO (1)
                                   51 IFSTFO (1)           52 IUMDB  (1)           53 IFMDB  (1)
                                   54 IUADD  (1)           55 IFADD  (1)           56 IUBAL  (1)
                                   57 IFBAL  (1)           58 IUDESF (1)           59 IFDESF (1)
                                   60 IUWT   (1)           61 IFWT   (1)           62 IUDUM1 (1)
                                   63 IFDUM1 (1)           64 IUDUM2 (1)           65 IFDUM2 (1)
                                   66 IUDUM3 (1)           67 IFDUM3 (1)           68 IUL    (1)
                                   69 IFL    (1)           70 IUYT   (1)           71 IFYT   (1)
                                   72 IUZ    (1)           73 IFZ    (1)           74 IUZR   (1)
                                   75 IFZR   (1)           76 IULR   (1)           77 IFLR   (1)
                                   78 IUBR   (1)           79 IFBR   (1)           80 IUPHTF (1)
                                   81 IFPHTF (1)           82 IUMODM (1)           83 IFMODM (1)
                                   84 IUMODK (1)           85 IFMODK (1)           86 IUPHT  (1)
                                   87 IFPHT  (1)           88 IUQT   (1)           89 IFQT   (1)
                                   90 IUQ    (1)           91 IFQ    (1)           92 IUPH   (1)
                                   93 IFPH   (1)           94 IUINCM (1)           95 IFINCM (1)
                                   96 IUINCK (1)           97 IFINCK (1)
       KLUES        24              0 KLUSE  (1)            1 KLUNAL (1)            2 IRED   (1)
                                    3 KLUMD  (1)            4 KLUBAL (1)            5 MSADD  (1)
                                    6 NPASS  (1)            7 IDNOPT (1)            8 VDES   (1)
                                    9 EPS1   (1)           10 DWMAX  (1)           11 NBAR   (1)
                                   12 NFIX   (1)           13 D      (1)           14 DEL    (1)
                                   15 EPS2   (1)           16 NCYC   (1)           17 NNN    (1)
                                   18 IBAND  (1)           19 IFIN   (1)           20 KLUB   (1)
```

```
COMMON BLOCKS   LENGTH    MEMBERS - BIAS NAME(LENGTH)
                                  21 KLUQ    (1)           22 MORBAL (1)           23 DBAL    (1)
    PLAYFF         26              0 IUMDFF (1)             1 IFMDFF (1)            2 IUDLTI (1)
                                   3 IFDLTI (1)             4 IUSLTI (1)            5 IFSLTI (1)
                                   6 IUMPLI (1)             7 IFMPLI (1)            8 IUTPGT (1)
                                   9 IFTPGT (1)            10 IUPATF (1)           11 IFPATF (1)
                                  12 IUMPL   (1)           13 IFMPL   (1)          14 IUSLT   (1)
                                  15 IFSLT   (1)           16 IUDLT   (1)          17 IFDLT   (1)
                                  18 IUQA    (1)           19 IFQA    (1)          20 IUQAT   (1)
                                  21 IFQAT   (1)           22 IUPHA   (1)          23 IFPHA   (1)
                                  24 IUPHAT (1)            25 IFPHAT (1)
    KLUFF           1              0 KFREE   (1)
    PLUG          129              0 EMP     (9)            9 PHP     (120)
    CLIST          11              0 KOUNT   (1)            1 KPAGE   (1)           2 LINES   (1)
                                   3 LINEST (1)             4 KLABEL (1)            5 KTPAGE (1)
                                   6 NPAGE   (1)            7 KBPAGE (1)            8 LINESG (1)
                                   9 KOUNTH (1)            10 KOUNTI (1)
    SIZES           6              0 NSTMEM (1)             1 NSTDOF (1)            2 NDYDOF (1)
                                   3 NNOPT   (1)            4 NDESNO (1)            5 NDESYS (1)
    CLUEV          21              0 LKLUEV (1)             1 KLUEV   (20)

STATISTICS
  PROGRAM LENGTH                1332B     730
  CM LABELED COMMON LENGTH       474B     316
        52000B CM USED
```

```
                  SUBROUTINE IV33(A,B)                                      IV33        2
            C                                                               IV33        3
                  DIMENSION A(3,3),B(3,3)                                   IV33        4
            C                                                               IV33        5
                  A11=A(1,1)                                                IV33        6
                  A21=A(2,1)                                                IV33        7
                  A22=A(2,2)                                                IV33        8
                  A31=A(3,1)                                                IV33        9
                  A32=A(3,2)                                                IV33       10
                  A33=A(3,3)                                                IV33       11
            C                                                               IV33       12
                  D=A11*(A22*A33-A32*A32)                                   IV33       13
                 1 -A21*(A21*A33-A32*A31)                                   IV33       14
                 2 +A31*(A21*A32-A22*A31)                                   IV33       15
            C                                                               IV33       16
                  B(1,1)= (A22*A33-A32*A32)/D                               IV33       17
                  B(2,1)=-(A21*A33-A32*A31)/D                               IV33       18
                  B(2,2)= (A11*A33-A31*A31)/D                               IV33       19
                  B(3,1)= (A21*A32-A22*A31)/D                               IV33       20
                  B(3,2)=-(A11*A32-A21*A31)/D                               IV33       21
                  B(3,3)= (A11*A22-A21*A21)/D                               IV33       22
                  B(1,2)=B(2,1)                                             IV33       23
                  B(1,3)=B(3,1)                                             IV33       24
                  B(2,3)=B(3,2)                                             IV33       25
            C                                                               IV33       26
                  RETURN                                                    IV33       27
                  END                                                       IV33       28
```

```
     SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS     DEF LINE     REFERENCES
    3  IV33           1          26

VARIABLES      SN  TYPE          RELOCATION
    0  A            REAL      ARRAY      F.P.     REFS       3      5      6      7       8      9     10
                                               DEFINED       1
   56  A11          REAL                          REFS      12     18     20     21 DEFINED      5
   57  A21          REAL                          REFS    3*12     17     19     20    2*21
                                               DEFINED       6
   60  A22          REAL                          REFS    2*12     16     19     21 DEFINED      7
   61  A31          REAL                          REFS    3*12     17   2*18     19      20
                                               DEFINED       8
   62  A32          REAL                          REFS    4*12   2*16     17     19      20
                                               DEFINED       9
   63  A33          REAL                          REFS    2*12     16     17     18 DEFINED     10
    0  B            REAL      ARRAY      F.P.     REFS       3     22     23     24 DEFINED      1     16
                                                    17      18     19     20     21      22     23     24
   64  D            REAL                          REFS      16     17     18     19      20     21
                                               DEFINED      12

STATISTICS
  PROGRAM LENGTH                 65B      53
```

```
      SUBROUTINE BSOLVE(KORE,WORK)                                      BSOLVE   2
C                                                                       BSOLVE   3
C                                                                       BSOLVE   4
      DIMENSION KLUEV(20)                                               BSOLVE   5
      DIMENSION NAMEYT(2)         ,NAMEZR(2)          ,NAMELR(2)        BSOLVE   6
     1         ,NAMEB (2)         ,NAMEBR(2)          ,NAMEBT(2)        BSOLVE   7
      DIMENSION IPOS(20)                                                BSOLVE   8
      DIMENSION WORK(1),NAME(2)                                         BSOLVE   9
C                                                                       BSOLVE  10
C                                                                       BSOLVE  11
C GIVEN MATRICES A AND Y, THIS SUBROUTINE SOLVES THE MATRIX EQUATION    BSOLVE  12
C AB=Y(TRAN) FOR B,AND THEN OBTAINS B(TRAN).                            BSOLVE  13
C                                                                       BSOLVE  14
      COMMON/PLACES/ IUIN1,IUIN2,IUOUT1,IUOUT2,IUGO1,IUGO2,IUGO3,IUGO4, BSOLVE  15
     1              IUSCR,IFSCR,IFS1,IFS2,IFS3,IFS4,IUCD,IUPR,          BSOLVE  16
     2              IUA,IFA,IUY,IFY,IUMEMN,IFMEMN,IUSTFN,IFSTFN,        BSOLVE  17
     3              IUKS,IFKS,IUB,IFB,IUDESO,IFDESO,                    BSOLVE  18
     4              IUMDBI,IFMDBI,IUADDI,IFADDI,IUBALI,IFBALI,          BSOLVE  19
     5              IUDESI,IFDESI,IUWTI,IFWTI,                          BSOLVE  20
     6              IUMEMO,IFMEMO,IUBT,IFBT,                            BSOLVE  21
     7              IUDESN,IFDESN,IUMD,IFMD,                            BSOLVE  22
     8              IUMEMF,IFMEMF,                                      BSOLVE  23
     9              IUSTFO,IFSTFO,IUMDB,IFMDB,IUADD,IFADD,IUBAL,IFBAL,  BSOLVE  24
     A              IUDESF,IFDESF,IUWT,IFWT,                            BSOLVE  25
     B              IUDUM1,IFDUM1,IUDUM2,IFDUM2,IUDUM3,IFDUM3,          BSOLVE  26
     C              IUL,IFL,IUYT,IFYT,IUZ,IFZ,IUZR,IFZR,IULR,IFLR,      BSOLVE  27
     D              IUBR,IFBR,                                          BSOLVE  28
     E              IUPHTF,IFPHTF,IUMODM,IFMODM,                        BSOLVE  29
     F              IUMODK,IFMODK,IUPHT,IFPHT,IUQT,IFQT,IUQ,IFQ,        BSOLVE  30
     G              IUPH,IFPH,IUINCM,IFINCM,IUINCK,IFINCK               BSOLVE  31
      COMMON /FILE  / IPOS                                              BSOLVE  32
      COMMON /CLUEV / LKLUEV ,KLUEV                                     BSOLVE  33
      COMMON /CLIST / KOUNT,KPAGE,LINES,LINEST,KLABEL,KTPAGE,NPAGE      BSOLVE  34
     1              ,KBPAGE,LINESG,KOUNTH,KOUNTI                        BSOLVE  35
      COMMON /KLUFF/ KFREE                                              BSOLVE  36
C                                                                       BSOLVE  37
      DATA NAMEYT /4HYTRA, 4HNSPO/                                      BSOLVE  38
      DATA NAMEZR /4HZREV, 4HERSE/                                      BSOLVE  39
      DATA NAMELR /4HLREV, 4HERSE/                                      BSOLVE  40
      DATA NAMEBR /4HBREV, 4HERSE/                                      BSOLVE  41
      DATA NAMEBT /4HBTRA, 4HNSPO/                                      BSOLVE  42
      DATA NAMEB /4HBMAT,4HRIX /                                        BSOLVE  43
      IOB=KLUEV(6)                                                      BSOLVE  44
      KLISTM=1                                                          BSOLVE  45
      KTYPE  =  2                                                       BSOLVE  46
      KOUNT=LINES                                                       BSOLVE  47
      IPOS(IUGO3)=IFS3                                                  BSOLVE  48
      IPOS(IUGO4)=IFS4                                                  BSOLVE  49
C                                                                       BSOLVE  50
C                                                                       BSOLVE  51
C STEP1. SPLIT A, A=L*L(TRAN). OBTAIN LOWER TRIANGLE L.                 BSOLVE  52
C                                                                       BSOLVE  53
      CALL PROGNA (4H(BSO. 4HLVE))                                      BSOLVE  54
      CALL MSGO2 (1)                                                    BSOLVE  55
      IPOS(IUA)=IFA                                                     BSOLVE  56
      IPOS(IUL)=IFL                                                     BSOLVE  57
      CALL SFACT (KORE,WORK,IUA,IUL,IUGO3,IUGO4,KLISTM,KTYPE)           BSOLVE  58
```

```
      C                                                                 BSOLVE   59
      C                                                                 BSOLVE   60
      C STEP2. TRANSPOSE Y TO OBTAIN YT.                                BSOLVE   61
      C                                                                 BSOLVE   62
            JUNITF =  IUY + 1                                           BSOLVE   63
            CALL PROGNA (4H(BSO, 4HLVE))                                BSOLVE   64
            CALL MSGO2 (2)                                              BSOLVE   65
            IPOS(IUY)=IFY                                               BSOLVE   66
            IPOS(IUYT)=IFYT                                             BSOLVE   67
            CALL TRAN (KORE,WORK,WORK,IUY,IUYT,IUGO3,IUGO4,JUNITF,NAMEYT) BSOLVE   68
      C                                                                 BSOLVE   69
      C                                                                 BSOLVE   70
      C STEP3. SOLVE LZ=YT FOR Z.                                       BSOLVE   71
      C                                                                 BSOLVE   72
            CALL PROGNA (4H(BSO, 4HLVE))                                BSOLVE   73
            CALL MSGO2 (3)                                              BSOLVE   74
            IPOS(IUL)=IFL                                               BSOLVE   75
            IPOS(IUYT)=IFYT                                             BSOLVE   76
            IPOS(IUZ)=IFZ                                               BSOLVE   77
            CALL QFSOL(KORE,WORK,IUL,IUYT,IUZ,IUGO3,IUGO4)              BSOLVE   78
      C                                                                 BSOLVE   79
      C                                                                 BSOLVE   80
      C STEP4. REVERSE Z TO OBTAIN ZR.                                  BSOLVE   81
            CALL PROGNA (4H(BSO, 4HLVE))                                BSOLVE   82
            CALL MSGO2 (4)                                              BSOLVE   83
      C                                                                 BSOLVE   84
            IPOS(IUZ)=IFZ                                               BSOLVE   85
            IPOS(IUZR)=IFZR                                             BSOLVE   86
            CALL REVERS (KORE,WORK,WORK,IUZ,IUZR,NAMEZR)                BSOLVE   87
      C                                                                 BSOLVE   88
      C                                                                 BSOLVE   89
      C STEP5. REVERSE L TO OBTAIN LR.                                  BSOLVE   90
            CALL PROGNA (4H(BSO, 4HLVE))                                BSOLVE   91
            CALL MSGO2 (5)                                              BSOLVE   92
      C                                                                 BSOLVE   93
            IPOS(IUL)=IFL                                               BSOLVE   94
            IPOS(IULR)=IFLR                                             BSOLVE   95
            CALL REVERS (KORE,WORK,WORK,IUL,IULR,NAMELR)                BSOLVE   96
      C                                                                 BSOLVE   97
      C                                                                 BSOLVE   98
      C STEP6  SOLVE LR(TRAN)*BR=ZR FOR BR.                             BSOLVE   99
      C                                                                 BSOLVE  100
            CALL PROGNA (4H(BSO, 4HLVE))                                BSOLVE  101
            CALL MSGO2 (6)                                              BSOLVE  102
            IPOS(IULR)=IFLR                                             BSOLVE  103
            IPOS(IUZR)=IFZR                                             BSOLVE  104
            IPOS(IUBR)=IFBR                                             BSOLVE  105
            CALL QBSOL (KORE,WORK,NAMEBR,IULR,IUZR,IUBR,IUGO3,IUGO4)    BSOLVE  106
      C                                                                 BSOLVE  107
      C                                                                 BSOLVE  108
      C STEP7. REVERSE BR TO OBTAIN B.                                  BSOLVE  109
      C                                                                 BSOLVE  110
            CALL PROGNA (4H(BSO, 4HLVE))                                BSOLVE  111
            CALL MSGO2 (7)                                              BSOLVE  112
            IPOS(IUBR)=IFBR                                             BSOLVE  113
            IPOS(IUB)=IFB                                               BSOLVE  114
            CALL REVERS (KORE,WORK,WORK,IUBR,IUB,NAMEB)                 BSOLVE  115
```

```
      C                                                                    BSOLVE     116
      C                                                                    BSOLVE     117
      C STEP8. TRANSPOSE B TO OBTAIN BT.                                   BSOLVE     118
      C                                                                    BSOLVE     119
            JUNITF=IUB+1                                                   BSOLVE     120
            CALL PROGNA (4H(BSO, 4HLVE))                                   BSOLVE     121
            CALL MSGO2 (8)                                                 BSOLVE     122
            IPOS(IUB)=IFB                                                  BSOLVE     123
            IPOS(IUBT)=IFBT                                                BSOLVE     124
            CALL TRAN (KORE,WORK,WORK,IUB,IUBT,IUGO3,IUGO4,JUNITF,NAMEBT)  BSOLVE     125
      C                                                                    BSOLVE     126
            CALL PROGNA (4H(BSO, 4HLVE))                                   BSOLVE     127
      C                                                                    BSOLVE     128
            IF(IOB.NE.2) GO TO 100                                         BSOLVE     129
            IF(KFREE.EQ.1) CALL PRMAT1(IUB,IFB,WORK,O,IUPR,7,88,           BSOLVE     130
           1 88H (TRANSPOSE OF BMATRIX TRANSFORMS DISPLACEMENTS FROM DYNAMICS BSOLVE  131
           2MODEL TO STRUCTURES MODEL))                                    BSOLVE     132
      C                                                                    BSOLVE     133
            IF(KFREE.EQ.2) CALL PRMAT1(IUB,IFB,WORK,O,IUPR,7,97,           BSOLVE     134
           1 97H (TRANSPOSE OF BMATRIX TRANSFORMS RELATIVE DISPLACEMENTS FROM BSOLVE  135
           2DYNAMICS MODEL TO STRUCTURES MODEL))                           BSOLVE     136
        100 CONTINUE                                                       BSOLVE     137
      C                                                                    BSOLVE     138
      C                                                                    BSOLVE     139
            RETURN                                                         BSOLVE     140
            END                                                            BSOLVE     141
```

SYMBOLIC REFERENCE MAP (R=3)

```
ENTRY POINTS      DEF LINE     REFERENCES
    3  BSOLVE          1         139

VARIABLES      SN  TYPE            RELOCATION
   21  IFA         INTEGER              PLACES       REFS        14        55
   67  IFADD       INTEGER              PLACES       REFS        14
   41  IFADDI      INTEGER              PLACES       REFS        14
   33  IFB         INTEGER              PLACES       REFS        14       113       122       129       133
   71  IFBAL       INTEGER              PLACES       REFS        14
   43  IFBALI      INTEGER              PLACES       REFS        14
  117  IFBR        INTEGER              PLACES       REFS        14       104       112
   53  IFBT        INTEGER              PLACES       REFS        14       123
   73  IFDESF      INTEGER              PLACES       REFS        14
   45  IFDESI      INTEGER              PLACES       REFS        14
   55  IFDESN      INTEGER              PLACES       REFS        14
   35  IFDESO      INTEGER              PLACES       REFS        14
   77  IFDUM1      INTEGER              PLACES       REFS        14
  101  IFDUM2      INTEGER              PLACES       REFS        14
  103  IFDUM3      INTEGER              PLACES       REFS        14
  141  IFINCK      INTEGER              PLACES       REFS        14
  137  IFINCM      INTEGER              PLACES       REFS        14
   31  IFKS        INTEGER              PLACES       REFS        14
  105  IFL         INTEGER              PLACES       REFS        14        56        74        93
  115  IFLR        INTEGER              PLACES       REFS        14        94       102
```

```
VARIABLES      SN  TYPE            RELOCATION
   57  IFMD        INTEGER              PLACES      REFS         14
   65  IFMDB       INTEGER              PLACES      REFS         14
   37  IFMDBI      INTEGER              PLACES      REFS         14
   61  IFMEMF      INTEGER              PLACES      REFS         14
   25  IFMEMN      INTEGER              PLACES      REFS         14
   51  IFMEMO      INTEGER              PLACES      REFS         14
  125  IFMODK      INTEGER              PLACES      REFS         14
  123  IFMODM      INTEGER              PLACES      REFS         14
  135  IFPH        INTEGER              PLACES      REFS         14
  127  IFPHT       INTEGER              PLACES      REFS         14
  121  IFPHTF      INTEGER              PLACES      REFS         14
  133  IFQ         INTEGER              PLACES      REFS         14
  131  IFQT        INTEGER              PLACES      REFS         14
   11  IFSCR       INTEGER              PLACES      REFS         14
   27  IFSTFN      INTEGER              PLACES      REFS         14
   63  IFSTFO      INTEGER              PLACES      REFS         14
   12  IFS1        INTEGER              PLACES      REFS         14
   13  IFS2        INTEGER              PLACES      REFS         14
   14  IFS3        INTEGER              PLACES      REFS         14       47
   15  IFS4        INTEGER              PLACES      REFS         14       48
   75  IFWT        INTEGER              PLACES      REFS         14
   47  IFWTI       INTEGER              PLACES      REFS         14
   23  IFY         INTEGER              PLACES      REFS         14       65
  107  IFYT        INTEGER              PLACES      REFS         14       66       75
  111  IFZ         INTEGER              PLACES      REFS         14       76       84
  113  IFZR        INTEGER              PLACES      REFS         14       85      103
  417  IOB         INTEGER                          REFS        128  DEFINED       43
    0  IPOS        INTEGER     ARRAY    FILE        REFS          7       31  DEFINED       47       48       55       56
                                                      65         66       74       75       76       84       85       93
                                                      94        102      103      104      112      113      122      123
   20  IUA         INTEGER              PLACES      REFS         14       55       57
   66  IUADD       INTEGER              PLACES      REFS         14
   40  IUADDI      INTEGER              PLACES      REFS         14
   32  IUB         INTEGER              PLACES      REFS         14      113      114      119      122      124      129
                                                     133
   70  IUBAL       INTEGER              PLACES      REFS         14
   42  IUBALI      INTEGER              PLACES      REFS         14
  116  IUBR        INTEGER              PLACES      REFS         14      104      105      112      114
   52  IUBT        INTEGER              PLACES      REFS         14      123      124
   16  IUCD        INTEGER              PLACES      REFS         14
   72  IUDESF      INTEGER              PLACES      REFS         14
   44  IUDESI      INTEGER              PLACES      REFS         14
   54  IUDESN      INTEGER              PLACES      REFS         14
   34  IUDESO      INTEGER              PLACES      REFS         14
   76  IUDUM1      INTEGER              PLACES      REFS         14
  100  IUDUM2      INTEGER              PLACES      REFS         14
  102  IUDUM3      INTEGER              PLACES      REFS         14
    4  IUGO1       INTEGER              PLACES      REFS         14
    5  IUGO2       INTEGER              PLACES      REFS         14
    6  IUGO3       INTEGER              PLACES      REFS         14       47       57       67       77      105      124
    7  IUGO4       INTEGER              PLACES      REFS         14       48       57       67       77      105      124
  140  IUINCK      INTEGER              PLACES      REFS         14
  136  IUINCM      INTEGER              PLACES      REFS         14
    0  IUIN1       INTEGER              PLACES      REFS         14
    1  IUIN2       INTEGER              PLACES      REFS         14
   30  IUKS        INTEGER              PLACES      REFS         14
```

```
C45700  SUB  QCHOL (FACTORIZATION OF STIFFNESS MATRIX)                  QCHOL       2
C                                                                       QCHOL       3
C********************************************************************** QCHOL       4
C                                                                     * QCHOL       5
C***  SUBROUTINE QCHOL  (A      ,X      ,L      ,M      ,NU     ,KORE   * QCHOL       6
C                        ,ML     ,MI     ,MO     ,KEY    ,KEE    ,NIX    * QCHOL       7
C                        ,WORST  ,NAME)                                * QCHOL       8
C                                                                     * QCHOL       9
C***  COMPUTER VERSION  ************************************************ QCHOL      10
C     ----------------                                                * QCHOL      11
C     IBM .... INCLUDES DOUBLE PRECISION TYPE STATEMENTS.  COLUMN ONE  * QCHOL      12
C              SHOULD BE BLANK.                                        * QCHOL      13
C                                                                     * QCHOL      14
C     CDC .... DOES NOT INCLUDE DOUBLE PRECISION TYPE STATEMENTS.      * QCHOL      15
C              THESE STATEMENTS ARE CONVERTED INTO COMMENTS BY         * QCHOL      16
C              INSERTING THE LETTER C IN COLUMN ONE.                   * QCHOL      17
C                                                                     * QCHOL      18
C***  OBJECTIVE  ******************************************************* QCHOL      19
C     ---------                                                       * QCHOL      20
C     PERFORMS THE FACTORIZATION OF THE STIFFNESS MATRIX UNDER THE    * QCHOL      21
C     CONTROL OF QFACT   THE FACTORIZATION IS DONE IN BLOCKS.  IF THE * QCHOL      22
C     END OF THE MATRIX FITS IN CORE THE CLUE KEY IS SET TO ZERO.     * QCHOL      23
C                                                                     * QCHOL      24
C***  INPUT/OUTPUT  **************************************************** QCHOL      25
C     ------------                                                    * QCHOL      26
C     THE SUBROUTINE RECEIVES THE STIFFNESS MATRIX IN BLOCKS FROM THE * QCHOL      27
C     CALLING ROUTINE QFACT, AND RETURNS THE LOWER TRIANGLE           * QCHOL      28
C     FACTORIZATION ON THE TAPE ML.                                   * QCHOL      29
C                                                                     * QCHOL      30
C***  SUMMARY OF SYMBOLS  ********************************************** QCHOL      31
C     ------------------                                              * QCHOL      32
C                                                                     * QCHOL      33
C***  ERROR MESSAGES  ************************************************** QCHOL      34
C     --------------                                                  * QCHOL      35
C     NONE.                                                             QCHOL      36
C                                                                     * QCHOL      37
C********************************************************************** QCHOL      38
C                                                                       QCHOL      39
      SUBROUTINE QCHOL (A,X,L,M,NU,KORE,ML,MI.MO,KEY,KEE,NIX,WORST      QCHOL      40
     1                  ,NAME.KLISTM,KTYPE)                             QCHOL      41
C                                                                       QCHOL      42
      INTEGER YES                                                       QCHOL      43
C                                                                       QCHOL      44
CIBM  BEGINNING OF TYPE STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS QCHOL     45
C     DOUBLE PRECISION S                                                QCHOL      46
CIBM  ENDING OF TYPE STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS   QCHOL      47
C                                                                       QCHOL      48
      DIMENSION HEAD(5,5),HOLD(5)                                       QCHOL      49
      DIMENSION LCOL(5)           ,LROW(5)                              QCHOL      50
      DIMENSION A(1),X(1),L(1),NAME(2)                                  QCHOL      51
      DIMENSION ROW(5)                                                  QCHOL      52
C                                                                       QCHOL      53
      COMMON /PROBSZ/M2.N.IBANDW.H,K1,M1,MILSUM.IDEBUG                  QCHOL      54
      COMMON /COMRWP/ ITAPER.ITAPEW,ITAPEP                              QCHOL      55
      COMMON /CONSTS/ NO    .YES                                        QCHOL      56
      COMMON /CLIST / KOUNT ,KPAGE ,LINES ,LINEST,KLABEL,KTPAGE.NPAGE    QCHOL      57
     1                KPPAGE,LINESC,KOUNTH,KOUNTI                       QCHOL      58
```

```
COMMON BLOCKS   LENGTH     MEMBERS - BIAS NAME(LENGTH)
       COMRWP        3              0 ITAPER (1)           1 ITAPEW (1)            2 ITAPEP (1)
       CIDIV         1              0 IDIV   (1)
       CONSTS        2              0 NO     (1)           1 YES    (1)
       CLIST        11              0 KOUNT  (1)           1 KPAGE  (1)            2 LINES  (1)
                                    3 LINEST (1)           4 KLABEL (1)            5 KTPAGE (1)
                                    6 NPAGE  (1)           7 KBPAGE (1)            8 LINESG (1)
                                    9 KOUNTH (1)          10 KOUNTI (1)
       FILE         20              0 IPOS   (20)

STATISTICS
  PROGRAM LENGTH                435B     285
  CM LABELED COMMON LENGTH       45B      37
        52000B CM USED
```

```
VARIABLES      SN  TYPE           RELOCATION
  363  LEFT        INTEGER                      REFS      70       80   DEFINED       69
    2  LINES       INTEGER              CLIST   REFS      48       84        85       98        99      105      106
                                                 112     113
   10  LINESG      INTEGER              CLIST   REFS      48
    3  LINEST      INTEGER              CLIST   REFS      48
  357  M           INTEGER                      REFS      65       66        67       68        70     2*76     2*79
                                                  80
    0  MA          INTEGER               F.P.   REFS      64       65        72      119   DEFINED       36
  377  MATNAM      INTEGER     ARRAY            REFS      42       76   DEFINED       58
  401  MATNAN      INTEGER     ARRAY            REFS      42       79   DEFINED       59
  364  MI          INTEGER                      REFS      80       91        92       93   DEFINED       72       90
    0  ML          INTEGER               F.P.   REFS      75       76        80      120   DEFINED       36
  365  MO          INTEGER                      REFS      78       79        80       90   DEFINED       73       91
    0  M1          INTEGER               F.P.   REFS      71       73       121  DEFINED        36
    0  M2          INTEGER               F.P.   REFS      71      122   DEFINED       36
  374  N        *  INTEGER                      REFS      93
  403  NAME        INTEGER     ARRAY            REFS      43       65        80       93
  356  NFILMA      INTEGER                      REFS      65  DEFINED        64
  373  NFILMI      INTEGER                      REFS      93  DEFINED        92
  367  NFILML      INTEGER                      REFS      76  DEFINED        75
  370  NFILMO      INTEGER                      REFS      79  DEFINED        78
  353  NIX         INTEGER                      REFS      80       82        97  DEFINED        61
    0  NO          INTEGER             CONSTS   REFS      47
    6  NPAGE       INTEGER              CLIST   REFS      48
  366  NU          INTEGER                      REFS      80  DEFINED        74
  355  W           REAL                         REFS      80  DEFINED        63
    1  YES         INTEGER             CONSTS   REFS      38       47
       VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS            TYPE   ARGS        REFERENCES
       DCLOSE                 1             119      120      121      122
       GEDLAB                 6              65       93
       MESAGE                 3              55      124
       PROGNA                 2              54
       PUDLAB                 6              76       79
       QCHOL                 16              80
       TIMEB                  2              57      123
       TITLES                 1              86      100      107      114

STATEMENT LABELS              DEF LINE   REFERENCES
  321  4         FMT             127        101      108
  325  5         FMT             128         87
  333  20        FMT             129        115
    0  60            INACTIVE     61
    0  70            INACTIVE     66
    0  80            INACTIVE     67         66
    0  100           INACTIVE     71       2*70
   45  110                        77         94
    0  120           INACTIVE     83         82
    0  130           INACTIVE     84       2*83
  110  150                        95         83
  111  160                        97         82
  124  920                       104         70
  137  930                       111       2*66
  152  950                       118         82       96      103      110
```

```
              WRITE(ITAPEW,20)                                            QFACT     116
              KOUNT=KOUNT+2                                               QFACT     117
        C                                                                 QFACT     118
          950 CONTINUE                                                    QFACT     119
              CALL DCLOSE (MA)                                            QFACT     120
              CALL DCLOSE (ML)                                            QFACT     121
              CALL DCLOSE (M1)                                            QFACT     122
              CALL DCLOSE (M2)                                            QFACT     123
              CALL TIMEB (10,10HFROM QFACT)                               QFACT     124
              CALL MESAGE (2, 5, 5HQFACT)                                 QFACT     125
        C FORMAT STATEMENTS                                               QFACT     126
        C                                                                 QFACT     127
            4 FORMAT(/,10X,10(1H*),5HERROR,I4,10(1H*))                    QFACT     128
            5 FORMAT(/,10X,   38HLOWER TRIANGLE EXCEEDS STORAGE IN CORE)  QFACT     129
           20 FORMAT(/,10X,   46HERROR...MATRIX LABEL INDICATES THAT MATRIX TO , QFACT  130
             1                22HBE SPLIT IS NOT SQUARE)                  QFACT     131
        C                                                                 QFACT     132
              RETURN                                                      QFACT     133
              END                                                         QFACT     134
```

SYMBOLIC REFERENCE MAP (R=3)

```
ENTRY POINTS     DEF LINE     REFERENCES
    3  QFACT         36         132

VARIABLES     SN  TYPE          RELOCATION
    0  A            REAL      ARRAY    F.P.        REFS      40      3*80  DEFINED     36
    0  IDIV         INTEGER            CIDIV       REFS      46        68
  376  IND          INTEGER                        REFS     101       108  DEFINED     97      104      111
  360  IO           INTEGER                        REFS      65        66       91  DEFINED      71
    0  IPOS         INTEGER   ARRAY    FILE        REFS      41        50       64      75       78       92
    2  ITAPEP       INTEGER            COMRWP      REFS      45
    0  ITAPER       INTEGER            COMRWP      REFS      45
    1  ITAPEW       INTEGER            COMRWP      REFS      45   I/O REFS      87     101      108      115
  375  K          * INTEGER                        REFS      93
    7  KBPAGE       INTEGER            CLIST       REFS      48
  354  KEE          INTEGER                        REFS      80   DEFINED       62      89
  371  KEY          INTEGER                        REFS      80        83
    4  KLABEL       INTEGER            CLIST       REFS      48
    0  KLISTM       INTEGER            F.P.        REFS      80   DEFINED       36
    0  KORE         INTEGER            F.P.        REFS      68   DEFINED       36
    0  KOUNT        INTEGER            CLIST       REFS      48        84       88      98      102      105      109
                                                    112     116   DEFINED       85      88       99      102      106
                                                    109     113       116
   11  KOUNTH       INTEGER            CLIST       REFS      48
   12  KOUNTI       INTEGER            CLIST       REFS      48
    1  KPAGE        INTEGER            CLIST       REFS      48
    5  KTPAGE       INTEGER            CLIST       REFS      48
    0  KTYPE        INTEGER            F.P.        REFS      80   DEFINED       36
  372  LAFT         INTEGER                        REFS      85        99      106     113  DEFINED       84       98
                                                    105     112
  361  LARGE        INTEGER                        REFS      69        80  DEFINED      67
```

```
      DATA MATNAM/4HLOTR,4HISTF/                                     QFACT    59
      DATA MATNAN/4HSCRA,4HTCH2/                                     QFACT    60
C                                                                    QFACT    61
   60 NIX = 0                                                        QFACT    62
      KEE = 0                                                        QFACT    63
      W = 2.                                                         QFACT    64
      NFILMA =  IPOS(MA)                                             QFACT    65
      CALL GEDLAB (8HQFACT 01,MA,NAME   ,NFILMA,M,IO)                QFACT    66
   70 IF (M-IO) 930,80,930                                           QFACT    67
   80 LARGE = M + 2                                                  QFACT    68
      LEAVE = KORE - M / IDIV                                        QFACT    69
      LEFT = LEAVE - LARGE                                           QFACT    70
      IF (LEFT - M) 920,100,100                                      QFACT    71
  100 IO = M1 + M2                                                   QFACT    72
      MI = MA                                                        QFACT    73
      MO = M1                                                        QFACT    74
      NU = 1                                                         QFACT    75
      NFILML =  IPOS(ML)                                             QFACT    76
      CALL PUDLAB (8HQFACT 01,ML,MATNAM,NFILML,M,M )                 QFACT    77
  110 CONTINUE                                                       QFACT    78
      NFILMO =  IPOS(MO)                                             QFACT    79
      CALL PUDLAB (8HQFACT 02,MO,MATNAN,NFILMO,M,M )                 QFACT    80
      CALL QCHOL (A(LARGE),A,A(LEAVE),M,NU,LEFT,ML,MI,MO,KEY,KEE,NIX,W,  QFACT    81
     1            NAME,KLISTM,KTYPE)                                 QFACT    82
      IF (NIX) 950,120,160                                           QFACT    83
  120 IF (KEY) 130,150,130                                           QFACT    84
  130 LAFT=LINES-KOUNT                                               QFACT    85
      IF(LAFT.LT.2) KOUNT=LINES                                      QFACT    86
      CALL TITLES(2)                                                 QFACT    87
      WRITE(ITAPEW,5)                                                QFACT    88
      KOUNT=KOUNT+2                                                  QFACT    89
      KEE = 1                                                        QFACT    90
      MI = MO                                                        QFACT    91
      MO = IO - MI                                                   QFACT    92
      NFILMI =  IPOS(MI)                                             QFACT    93
      CALL GEDLAB (8HQFACT 02,MI,NAME   ,NFILMI,N,K )                QFACT    94
      GO TO 110                                                      QFACT    95
  150 CONTINUE                                                       QFACT    96
      GO TO 950                                                      QFACT    97
  160 IND=NIX                                                        QFACT    98
      LAFT=LINES-KOUNT                                               QFACT    99
      IF(LAFT.LT.2) KOUNT=LINES                                      QFACT   100
      CALL TITLES(2)                                                 QFACT   101
      WRITE(ITAPEW,4) IND                                            QFACT   102
      KOUNT=KOUNT+2                                                  QFACT   103
      GO TO 950                                                      QFACT   104
  920 IND=52                                                         QFACT   105
      LAFT=LINES-KOUNT                                               QFACT   106
      IF(LAFT.LT.2) KOUNT=LINES                                      QFACT   107
      CALL TITLES(2)                                                 QFACT   108
      WRITE(ITAPEW,4) IND                                            QFACT   109
      KOUNT=KOUNT+2                                                  QFACT   110
      GO TO 950                                                      QFACT   111
  930 IND=16                                                         QFACT   112
      LAFT=LINES-KOUNT                                               QFACT   113
      IF(LAFT.LT.2) KOUNT=LINES                                      QFACT   114
      CALL TITLES(2)                                                 QFACT   115
```

```
C45700. SUB. QFACT (REND STIFFNESS MATRIX - DECOMPOSE TO LOWER TRIANG.)  QFACT     2
C                                                                        QFACT     3
C*********************************************************************** QFACT     4
C                                                                      * QFACT     5
C***  SUBROUTINE QFACT  (MA     ,ML     ,M1     ,M2) ******************** QFACT     6
C                                                                      * QFACT     7
C***  COMPUTER VERSION                                                 * QFACT     8
C     ----------------                                                 * QFACT     9
C     IBM .... AS IS.                                                  * QFACT    10
C                                                                      * QFACT    11
C     CDC .... AS IS.                                                  * QFACT    12
C                                                                      * QFACT    13
C***  OBJECTIVE  ******************************************************** QFACT    14
C     ---------                                                        * QFACT    15
C     READS THE POSITIVE DEFINITE SYMMETRIC STIFFNESS MATRIX AND SETS  * QFACT    16
C     UP INDICES FOR THE SUBROUTINE QCHOL TO GET THE LOWER TRIANGLE    * QFACT    17
C     OF AN L X L TRANSPOSE DECOMPOSITION ONE ROW AT A TIME.           * QFACT    18
C                                                                      * QFACT    19
C***  INPUT/OUTPUT  ***************************************************** QFACT    20
C     ------------                                                     * QFACT    21
C     THIS SUBROUTINE RECEIVES THE NAMES OF THE STIFFNESS AND LOWER    * QFACT    22
C     TRIANGULAR MATRICES AND USES THEM TOGETHER WITH THEIR SIZES TO   * QFACT    23
C     CONTROL QCHOL.                                                   * QFACT    24
C                                                                      * QFACT    25
C***  SUMMARY OF SYMBOLS  *********************************************** QFACT    26
C     ------------------                                               * QFACT    27
C                                                                      * QFACT    28
C***  ERROR MESSAGES  *************************************************** QFACT    29
C     --------------                                                   * QFACT    30
C     **** ERROR --- ****.                                             * QFACT    31
C     **** ERROR - DIMENSIONS READ FROM LABEL OF TOTAL STIFFNESS       * QFACT    32
C     MATRIX INDICATE THAT THE MATRIX IS NOT SQUARE ****.                QFACT    33
C                                                                      * QFACT    34
C*********************************************************************** QFACT    35
C                                                                        QFACT    36
      SUBROUTINE QFACT (KORE,A,MA,ML,M1,M2,KLISTM,KTYPE)                 QFACT    37
C                                                                        QFACT    38
      INTEGER YES                                                        QFACT    39
C                                                                        QFACT    40
      DIMENSION A(1)                                                     QFACT    41
      DIMENSION IPOS(20)                                                 QFACT    42
      DIMENSION MATNAM(2)          ,MATNAN(2)                            QFACT    43
      DIMENSION NAME(2)                                                  QFACT    44
C                                                                        QFACT    45
      COMMON /COMRWP/ ITAPER,ITAPEW,ITAPEP                               QFACT    46
      COMMON /CIDIV / IDIV                                               QFACT    47
      COMMON /CONSTS/ NO     ,YES                                        QFACT    48
      COMMON /CLIST / KOUNT ,KPAGE ,LINES ,LINEST,KLABEL,KTPAGE,NPAGE    QFACT    49
     1              ,KBPAGE,LINESG,KOUNTH,KOUNTI                         QFACT    50
      COMMON /FILE  / IPOS                                               QFACT    51
C                                                                        QFACT    52
C DATA INITIALIZATION                                                    QFACT    53
C                                                                        QFACT    54
      CALL PROGNA (4H(QFA,4HCT ))                                        QFACT    55
      CALL MESAGE (1,38,38                                               QFACT    56
     1   HQFACT - MANAGES CHOLESKY FACTORIZATION)                        QFACT    57
      CALL TIMEB (11,11HFROM QFACT )                                     QFACT    58
```

```
COMMON BLOCKS    LENGTH     MEMBERS - BIAS NAME(LENGTH)
                                       6 NPAGE  (1)             7 KBPAGE (1)            8 LINESG (1)
                                       9 KOUNTH (1)            10 KOUNTI (1)

STATISTICS
  PROGRAM LENGTH               361B      241
  CM LABELED COMMON LENGTH      16B       14
          52000B CM USED
```

```
VARIABLES     SN  TYPE          RELOCATION
                                            64      2*66      79     2*81      94     2*96     109    2*111
                                           124     2*126   DEFINED   20        23      34       36      49
                                            51        64      66     79        81      94       96     109
                                           111       124     126
   11  KOUNTH    INTEGER          CLIST    REFS        7      23     36        51      66       81      96
                                           111       126
   12  KOUNTI    INTEGER          CLIST    REFS        7      20     23        34      36       49      51
                                            64        66      79     81        94      96      109     111
                                           124       126   DEFINED   19        33      48       63      78
                                            93       108     123
    1  KPAGE     INTEGER          CLIST    REFS        7
    0  KSTEP     INTEGER          F.P.     REFS       11   DEFINED    4
    5  KTPAGE    INTEGER          CLIST    REFS        7
    2  LINES     INTEGER          CLIST    REFS        7
   10  LINESG    INTEGER          CLIST    REFS        7
    3  LINEST    INTEGER          CLIST    REFS        7
  357  LSKIPA    INTEGER                   REFS       19      25     33        39      48       54      63
                                            69        78      84     93        99     108      114     123
                                           129   DEFINED      17     31        46      61       76      91
                                           106       121
  360  LSKIPB    INTEGER                   REFS       19      21     33        37      48       52      63
                                            67        78      82     93        97     108      112     123
                                           127   DEFINED      18     32        47      62       77      92
                                           107       122
  356  LTEXT     INTEGER                   REFS       19      33     48        63      78       93     108
                                           123   DEFINED      10
    6  NPAGE     INTEGER          CLIST    REFS        7
       VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS          TYPE   ARGS      REFERENCES
       PLB                  3           21      25        37      39     52        54      67       69      82
                                        84      97        99     112    114       127     129
       TITLES               1           22      35        50      65     80        95     110      125

STATEMENT LABELS             DEF LINE   REFERENCES
   23  100                      16         11
   42  200                      30         11
   62  300                      45         11
  102  400                      60         11
  122  500                      75         11
  142  600                      90         11
  162  700                     105         11
  202  800                     120         11
  221  1000                    131         26      40        55      70     85       100     115
  264  1100   FMT              133         24
  273  1200   FMT              135         38
  302  1300   FMT              137         53
  311  1400   FMT              139         68
  320  1500   FMT              141         83
  327  1600   FMT              143         98
  336  1700   FMT              145        113
  345  1800   FMT              147        128

COMMON BLOCKS    LENGTH     MEMBERS - BIAS NAME(LENGTH)
       COMRWP       3              0 ITAPER (1)           1 ITAPEW (1)            2 ITAPEP (1)
       CLIST       11              0 KOUNT  (1)           1 KPAGE  (1)            2 LINES  (1)
```

```
            GO TO 1000
      C
      C
      C STEP 8
      C
        800 CONTINUE
            LSKIPA =  0
            LSKIPB =  2
            KOUNTI =  LSKIPB + LSKIPA + LTEXT
            KOUNT  =  KOUNT + KOUNTI
            CALL TITLES (2)
            IF (KOUNT .EQ. KOUNTH) KOUNT = KOUNT + KOUNTI
            CALL PLB (1,LSKIPB,ITAPEW)
            WRITE (ITAPEW,1800)
            CALL PLB (1,LSKIPA,ITAPEW)
      C
       1000 CONTINUE
      C
       1100 FORMAT (10X,20(1H*),2X,28HSTEP  1  FROM PROGRAM BSOLVE,2X,20(1H*)
           1,/)
       1200 FORMAT (10X,20(1H*),2X,28HSTEP  2  FROM PROGRAM BSOLVE,2X,20(1H*)
           1,/)
       1300 FORMAT (10X,20(1H*),2X,28HSTEP  3  FROM PROGRAM BSOLVE,2X,20(1H*)
           1,/)
       1400 FORMAT (10X,20(1H*),2X,28HSTEP  4  FROM PROGRAM BSOLVE,2X,20(1H*)
           1,/)
       1500 FORMAT (10X,20(1H*),2X,28HSTEP  5  FROM PROGRAM BSOLVE,2X,20(1H*)
           1,/)
       1600 FORMAT (10X,20(1H*),2X,28HSTEP  6  FROM PROGRAM BSOLVE,2X,20(1H*)
           1,/)
       1700 FORMAT (10X,20(1H*),2X,28HSTEP  7  FROM PROGRAM BSOLVE,2X,20(1H*)
           1,/)
       1800 FORMAT (10X,20(1H*),2X,28HSTEP  8  FROM PROGRAM BSOLVE,2X,20(1H*)
           1,/)
      C
            RETURN
            END
```

SYMBOLIC REFERENCE MAP (R=3)

```
ENTRY POINTS      DEF LINE      REFERENCES
    3  MSGO2          4            150

VARIABLES      SN  TYPE            RELOCATION
    2  ITAPEP      INTEGER              COMRWP      REFS       6
    0  ITAPER      INTEGER              COMRWP      REFS       6
    1  ITAPEW      INTEGER              COMRWP      REFS       6       21      25      37      39      52      54
                                                      67      69       82      84      97      99     112     114
                                                     127     129   I/O REFS    24      38      53      68      83
                                                      98     113      128
    7  KBPAGE      INTEGER              CLIST       REFS       7
    4  KLABEL      INTEGER              CLIST       REFS       7
    0  KOUNT       INTEGER              CLIST       REFS       7       20    2*23      34    2*36      49    2*51
```

```
      C STEP 4
      C
        400 CONTINUE
            LSKIPA =  0
            LSKIPB =  2
            KOUNTI =  LSKIPB + LSKIPA + LTEXT
            KOUNT  =  KOUNT + KOUNTI
            CALL TITLES (2)
            IF (KOUNT .EQ. KOUNTH) KOUNT = KOUNT + KOUNTI
            CALL PLB (1,LSKIPB,ITAPEW)
            WRITE (ITAPEW,1400)
            CALL PLB (1,LSKIPA,ITAPEW)
            GO TO 1000
      C
      C
      C STEP 5
      C
        500 CONTINUE
            LSKIPA =  0
            LSKIPB =  2
            KOUNTI =  LSKIPB + LSKIPA + LTEXT
            KOUNT  =  KOUNT + KOUNTI
            CALL TITLES (2)
            IF (KOUNT .EQ. KOUNTH) KOUNT = KOUNT + KOUNTI
            CALL PLB (1,LSKIPB,ITAPEW)
            WRITE (ITAPEW,1500)
            CALL PLB (1,LSKIPA,ITAPEW)
            GO TO 1000
      C
      C
      C STEP 6
      C
        600 CONTINUE
            LSKIPA =  0
            LSKIPB =  2
            KOUNTI =  LSKIPB + LSKIPA + LTEXT
            KOUNT  =  KOUNT + KOUNTI
            CALL TITLES (2)
            IF (KOUNT .EQ. KOUNTH) KOUNT = KOUNT + KOUNTI
            CALL PLB (1,LSKIPB,ITAPEW)
            WRITE (ITAPEW,1600)
            CALL PLB (1,LSKIPA,ITAPEW)
            GO TO 1000
      C
      C
      C STEP 7
      C
        700 CONTINUE
            LSKIPA =  0
            LSKIPB =  2
            KOUNTI =  LSKIPB + LSKIPA + LTEXT
            KOUNT  =  KOUNT + KOUNTI
            CALL TITLES (2)
            IF (KOUNT .EQ. KOUNTH) KOUNT = KOUNT + KOUNTI
            CALL PLB (1,LSKIPB,ITAPEW)
            WRITE (ITAPEW,1700)
            CALL PLB (1,LSKIPA,ITAPEW)
```

```
      C                                                                 MSG02     2
      C45700, SUB. MSG02 (LIST MESSAGES - VERSION 02)                   MSG02     3
      C                                                                 MSG02     4
            SUBROUTINE MSG02 (KSTEP)                                    MSG02     5
      C                                                                 MSG02     6
            COMMON /COMRWP/ ITAPER,ITAPEW,ITAPEP                        MSG02     7
            COMMON /CLIST / KOUNT ,KPAGE ,LINES ,LINEST,KLABEL,KTPAGE,NPAGE MSG02 8
           1                 ,KBPAGE,LINESG,KOUNTH,KOUNTI               MSG02     9
      C                                                                 MSG02    10
            LTEXT=2                                                     MSG02    11
            GO TO (100, 200, 300, 400, 500,600, 700, 800), KSTEP        MSG02    12
      C                                                                 MSG02    13
      C                                                                 MSG02    14
      C STEP 1                                                          MSG02    15
      C                                                                 MSG02    16
        100 CONTINUE                                                    MSG02    17
            LSKIPA =  0                                                 MSG02    18
            LSKIPB=0                                                    MSG02    19
            KOUNTI =  LSKIPB + LSKIPA + LTEXT                           MSG02    20
            KOUNT  =  KOUNT + KOUNTI                                    MSG02    21
            CALL PLB (1,LSKIPB,ITAPEW)                                  MSG02    22
            CALL TITLES (2)                                             MSG02    23
            IF (KOUNT .EQ. KOUNTH) KOUNT = KOUNT + KOUNTI               MSG02    24
            WRITE (ITAPEW,1100)                                         MSG02    25
            CALL PLB (1,LSKIPA,ITAPEW)                                  MSG02    26
            GO TO 1000                                                  MSG02    27
      C                                                                 MSG02    28
      C STEP 2                                                          MSG02    29
      C                                                                 MSG02    30
        200 CONTINUE                                                    MSG02    31
            LSKIPA =  0                                                 MSG02    32
            LSKIPB =  2                                                 MSG02    33
            KOUNTI =  LSKIPB + LSKIPA + LTEXT                           MSG02    34
            KOUNT  =  KOUNT + KOUNTI                                    MSG02    35
            CALL TITLES (2)                                             MSG02    36
            IF (KOUNT .EQ. KOUNTH) KOUNT = KOUNT + KOUNTI               MSG02    37
            CALL PLB (1,LSKIPB,ITAPEW)                                  MSG02    38
            WRITE (ITAPEW,1200)                                         MSG02    39
            CALL PLB (1,LSKIPA,ITAPEW)                                  MSG02    40
            GO TO 1000                                                  MSG02    41
      C                                                                 MSG02    42
      C                                                                 MSG02    43
      C STEP 3                                                          MSG02    44
      C                                                                 MSG02    45
        300 CONTINUE                                                    MSG02    46
            LSKIPA =  0                                                 MSG02    47
            LSKIPB =  2                                                 MSG02    48
            KOUNTI =  LSKIPB + LSKIPA + LTEXT                           MSG02    49
            KOUNT  =  KOUNT + KOUNTI                                    MSG02    50
            CALL TITLES (2)                                             MSG02    51
            IF (KOUNT .EQ. KOUNTH) KOUNT = KOUNT + KOUNTI               MSG02    52
            CALL PLB (1,LSKIPB,ITAPEW)                                  MSG02    53
            WRITE (ITAPEW,1300)                                         MSG02    54
            CALL PLB (1,LSKIPA,ITAPEW)                                  MSG02    55
            GO TO 1000                                                  MSG02    56
      C                                                                 MSG02    57
```

```
STATISTICS
  PROGRAM LENGTH              532B     346
  CM LABELED COMMON LENGTH    227B     151
          52000B CM USED
```

```
EXTERNALS          TYPE   ARGS       REFERENCES
       MSGO2                1              54        64        73        82        91       101       111       121
       PRMAT1               8             129       133
       PROGNA               2              53        63        72        81        90       100       110       120       126
       QBSOL                8             105
       QFACT                8              57
       QFSOL                7              77
       REVERS               6              86        95       114
       TRAN                 9              67       124

STATEMENT LABELS            DEF LINE    REFERENCES
  203   100                    136         128

COMMON BLOCKS    LENGTH   MEMBERS - BIAS NAME(LENGTH)
       PLACES        98           0 IUIN1  (1)          1 IUIN2  (1)          2 IUOUT1 (1)
                                  3 IUOUT2 (1)          4 IUGO1  (1)          5 IUGO2  (1)
                                  6 IUGO3  (1)          7 IUGO4  (1)          8 IUSCR  (1)
                                  9 IFSCR  (1)         10 IFS1   (1)         11 IFS2   (1)
                                 12 IFS3   (1)         13 IFS4   (1)         14 IUCD   (1)
                                 15 IUPR   (1)         16 IUA    (1)         17 IFA    (1)
                                 18 IUY    (1)         19 IFY    (1)         20 IUMEMN (1)
                                 21 IFMEMN (1)         22 IUSTFN (1)         23 IFSTFN (1)
                                 24 IUKS   (1)         25 IFKS   (1)         26 IUB    (1)
                                 27 IFB    (1)         28 IUDESO (1)         29 IFDESO (1)
                                 30 IUMDBI (1)         31 IFMDBI (1)         32 IUADDI (1)
                                 33 IFADDI (1)         34 IUBALI (1)         35 IFBALI (1)
                                 36 IUDESI (1)         37 IFDESI (1)         38 IUWTI  (1)
                                 39 IFWTI  (1)         40 IUMEMO (1)         41 IFMEMO (1)
                                 42 IUBT   (1)         43 IFBT   (1)         44 IUDESN (1)
                                 45 IFDESN (1)         46 IUMD   (1)         47 IFMD   (1)
                                 48 IUMEMF (1)         49 IFMEMF (1)         50 IUSTFO (1)
                                 51 IFSTFO (1)         52 IUMDB  (1)         53 IFMDB  (1)
                                 54 IUADD  (1)         55 IFADD  (1)         56 IUBAL  (1)
                                 57 IFBAL  (1)         58 IUDESF (1)         59 IFDESF (1)
                                 60 IUWT   (1)         61 IFWT   (1)         62 IUDUM1 (1)
                                 63 IFDUM1 (1)         64 IUDUM2 (1)         65 IFDUM2 (1)
                                 66 IUDUM3 (1)         67 IFDUM3 (1)         68 IUL    (1)
                                 69 IFL    (1)         70 IUYT   (1)         71 IFYT   (1)
                                 72 IUZ    (1)         73 IFZ    (1)         74 IUZR   (1)
                                 75 IFZR   (1)         76 IULR   (1)         77 IFLR   (1)
                                 78 IUBR   (1)         79 IFBR   (1)         80 IUPHTF (1)
                                 81 IFPHTF (1)         82 IUMODM (1)         83 IFMODM (1)
                                 84 IUMODK (1)         85 IFMODK (1)         86 IUPHT  (1)
                                 87 IFPHT  (1)         88 IUQT   (1)         89 IFQT   (1)
                                 90 IUQ    (1)         91 IFQ    (1)         92 IUPH   (1)
                                 93 IFPH   (1)         94 IUINCM (1)         95 IFINCM (1)
                                 96 IUINCK (1)         97 IFINCK (1)
       FILE          20           0 IPOS   (20)
       CLUEV         21           0 LKLUEV (1)          1 KLUEV  (20)
       CLIST         11           0 KOUNT  (1)          1 KPAGE  (1)          2 LINES  (1)
                                  3 LINEST (1)          4 KLABEL (1)          5 KTPAGE (1)
                                  6 NPAGE  (1)          7 KBPAGE (1)          8 LINESG (1)
                                  9 KOUNTH (1)         10 KOUNTI (1)
       KLUFF          1           0 KFREE  (1)
```

```
VARIABLES      SN  TYPE            RELOCATION
  114  IULR       INTEGER              PLACES       REFS        14       94       95      102      105
   56  IUMD       INTEGER              PLACES       REFS        14
   64  IUMDB      INTEGER              PLACES       REFS        14
   36  IUMDBI     INTEGER              PLACES       REFS        14
   60  IUMEMF     INTEGER              PLACES       REFS        14
   24  IUMEMN     INTEGER              PLACES       REFS        14
   50  IUMEMO     INTEGER              PLACES       REFS        14
  124  IUMODK     INTEGER              PLACES       REFS        14
  122  IUMODM     INTEGER              PLACES       REFS        14
    2  IUOUT1     INTEGER              PLACES       REFS        14
    3  IUOUT2     INTEGER              PLACES       REFS        14
  134  IUPH       INTEGER              PLACES       REFS        14
  126  IUPHT      INTEGER              PLACES       REFS        14
  120  IUPHTF     INTEGER              PLACES       REFS        14
   17  IUPR       INTEGER              PLACES       REFS        14      129      133
  132  IUQ        INTEGER              PLACES       REFS        14
  130  IUQT       INTEGER              PLACES       REFS        14
   10  IUSCR      INTEGER              PLACES       REFS        14
   26  IUSTFN     INTEGER              PLACES       REFS        14
   62  IUSTFO     INTEGER              PLACES       REFS        14
   74  IUWT       INTEGER              PLACES       REFS        14
   46  IUWTI      INTEGER              PLACES       REFS        14
   22  IUY        INTEGER              PLACES       REFS        14       62       65       67
  106  IUYT       INTEGER              PLACES       REFS        14       66       67       75       77
  110  IUZ        INTEGER              PLACES       REFS        14       76       77       84       86
  112  IUZR       INTEGER              PLACES       REFS        14       85       86      103      105
  422  JUNITF     INTEGER                           REFS        67      124  DEFINED       62      119
    7  KBPAGE     INTEGER              CLIST        REFS        33
    0  KFREE      INTEGER              KLUFF        REFS        35      129      133
    4  KLABEL     INTEGER              CLIST        REFS        33
  420  KLISTM     INTEGER                           REFS        57  DEFINED       44
    1  KLUEV      INTEGER    ARRAY     CLUEV        REFS         4       32       43
    0  KORE       INTEGER               F.P.        REFS        57       67       77       86       95      105      114
                                                     124   DEFINED        1
    0  KOUNT      INTEGER              CLIST        REFS        33  DEFINED       46
   11  KOUNTH     INTEGER              CLIST        REFS        33
   12  KOUNTI     INTEGER              CLIST        REFS        33
    1  KPAGE      INTEGER              CLIST        REFS        33
    5  KTPAGE     INTEGER              CLIST        REFS        33
  421  KTYPE      INTEGER                           REFS        57  DEFINED       45
    2  LINES      INTEGER              CLIST        REFS        33       46
   10  LINESG     INTEGER              CLIST        REFS        33
    3  LINEST     INTEGER              CLIST        REFS        33
    0  LKLUEV     INTEGER              CLUEV        REFS        32
  437  NAME       INTEGER   *UNDEF                  REFS         8
  431  NAMEB      INTEGER    ARRAY                  REFS         5      114  DEFINED       42
  433  NAMEBR     INTEGER    ARRAY                  REFS         5      105  DEFINED       40
  435  NAMEBT     INTEGER    ARRAY                  REFS         5      124  DEFINED       41
  427  NAMELR     INTEGER    ARRAY                  REFS         5       95  DEFINED       39
  423  NAMEYT     INTEGER    ARRAY                  REFS         5       67  DEFINED       37
  425  NAMEZR     INTEGER    ARRAY                  REFS         5       86  DEFINED       38
    6  NPAGE      INTEGER              CLIST        REFS        33
    0  WORK       REAL       ARRAY      F.P.        REFS         8       57     2*67       77     2*86     2*95      105
                                                   2*114     2*124      129      133  DEFINED        1
```

```
      COMMON /CTABLE/ KTABLE,NPASS ,NROWS ,NCOLS ,NCOLST,KTABLO,NPAGEA   QCHOL     59
     1                ,ITAPET                                            QCHOL     60
      COMMON /REPORT/ KREPOR                                             QCHOL     61
C                                                                        QCHOL     62
      EQUIVALENCE (S,T)                                                  QCHOL     63
C                                                                        QCHOL     64
^                                                                        QCHOL     65
C FUNCTION DEFINITION                                                   QCHOL     66
      ABSF(X)       =  ABS(X)                                            QCHOL     67
      ALOGCF(X)     =  ALOG10(X)                                         QCHOL     68
      IABSF(I)      =  IABS(I)                                           QCHOL     69
      MAXOF(I,J)    =  MAXO(I,J)                                         QCHOL     70
      MINOF(I,J)    =  MINO(I,J)                                         QCHOL     71
      SQRTF(X)      =  SQRT(X)                                           QCHOL     72
C                                                                        QCHOL     73
C                                                                        QCHOL     74
C DATA INITIALIZATION                                                    QCHOL     75
C                                                                        QCHOL     76
      CALL MESAGE (1,30,30HQCHOL - CHOLESKY FACTORIZATION)               QCHOL     77
      IF (NU .GT. 1) GO TO 80                                            QCHOL     78
      NROWS  =  0                                                        QCHOL     79
      NCOLS  =  6                                                        QCHOL     80
      KTABLE =  2                                                        QCHOL     81
   80 CONTINUE                                                           QCHOL     82
      DATA HOLD /4HROW ,4H COL,4H    ,4H   V,4HALUE/                     QCHOL     83
      DO 12 IH=1,5                                                       QCHOL     84
      DO 12 JH=1,5                                                       QCHOL     85
   12 HEAD(IH,JH) = HOLD(IH)                                             QCHOL     86
      CALL PROGNA (4H(QCH,4HOL ))                                        QCHOL     87
      KOLUMN =  5                                                        QCHOL     88
      IF (KREPOR .EQ. YES) KOLUMN = 3                                    QCHOL     89
      IF(KEE.EQ.1) GO TO 101                                             QCHOL     90
      IF (KLISTM .EQ. YES) KOUNT = LINES                                 QCHOL     91
  101 MP2 = M+2                                                          QCHOL     92
      KEY = 0                                                            QCHOL     93
      LOST = 0                                                           QCHOL     94
      LDLD = 0                                                           QCHOL     95
      LAG = NU - 1                                                       QCHOL     96
C                                                                        QCHOL     97
C                                                                        QCHOL     98
C READ AND UNPACK STIFFNESS OR FLEXIBILITY MATRIX                        QCHOL     99
C                                                                        QCHOL    100
      DO 320  K = NU,M                                                   QCHOL    101
      KP1 = K + 1                                                        QCHOL    102
      CALL GETROW (MI,-1,DUMMY,KOUNTO)                                   QCHOL    103
      LOC     =  MP2 - KOUNTO                                            QCHOL    104
      CALL GETROW (MI,0,X(LOC),KOUNTO)                                   QCHOL    105
      CALL UNPACK (X(LOC),KOUNTO,X,K,LD)                                 QCHOL    106
      IF(KEE.EQ.1) GO TO 91                                              QCHOL    107
C                                                                        QCHOL    108
C                                                                        QCHOL    109
C LIST STIFFNESS OR FLEXIBILITY MATRIX                                   QCHOL    110
C                                                                        QCHOL    111
      IF (KLISTM .EQ. NO) GO TO 115                                      QCHOL    112
      LOC     =  0                                                       QCHOL    113
      J       =  0                                                       QCHOL    114
```

```
   52 KOL    =  0
   55 LOC    =  LOC + 1
      J      =  J + 1
      IF (J  GE  JCOLS) GO TO 60
      IF (    X(LOC)) 60, 55, 60
   60 KOL     =  KOL + 1
      LROW(KOL) =  K
      LCOL(KOL) =  J
       ROW(KOL) =  X(LOC)
      IF (J .EQ. JCOLS) GO TO 65
      IF (KOL .LT. KOLUMN) GO TO 55
   65 JCU     =  KOL
      CALL TITLES (2)
      IF (K .EQ. 1) KTABLE = 2
      IF (KTYPE .EQ. 1)
     1CALL PTABLE (2,34,34
     2   HLOWER TRIANGLE OF STIFFNESS MATRIX)
      IF (KTYPE .EQ. 2)
     1CALL PTABLE (2,36,36
     2   HLOWER TRIANGLE OF FLEXIBILITY MATRIX)
      IF (KOUNT .GT. KOUNTH) GO TO 70
      IF (KTYPE .EQ. 1) WRITE (ITAPEW,2001)
      IF (KTYPE .EQ. 2) WRITE (ITAPEW,2005)
      CALL PLB (1,1,ITAPEW)
      WRITE (ITAPEW,2002)   ((HEAD(IH,JH),IH=1,5),JH=1,KOLUMN)
      KOUNT  = KOUNT + 3
   70 CONTINUE
      KOUNT  = KOUNT + 1
      WRITE (ITAPEW,2003) (LROW(KOL), LCOL(KOL), ROW(KOL), KOL=1,JCU)
      IF (J .LT. JCOLS) GO TO 52
  115 CONTINUE
C
C
C FORM CHOLESKY DECOMPOSITION OF STIFFNESS OR FLEXIBILITY MATRIX
C
   91 IF(NU-1) 130,100,130
  100 IF (LD - K) 120,920,920
  120 L(K) = K   - LD
  130 IF (KEY) 170,140,170
  140 LEST = LOST + L(K)
      IF (LEST - KORE) 160,160,150
  150 KEY = 1
  160 LAST = K - 1
  170 LOW = KP1 - L(K)
      LD     =  MAXOF(LOW,NU)
      LD1 = LD - 1
  180 IF (LD - LAG) 190,230,200
  190 LATE = LAG
      LAG = LD + 1
      LDLD = -LDLD
      GO TO 210
  200 LATE = LD
      LAG = LAG + 1
  210 DO 220  I = LAG,LATE
  220 LDLD = LDLD + L(I)
      LDLD   =  IABSF(LDLD)
  230 II = LDLD
```

```
      LARK = LDLD - LD1                                                 QCHOL    173
C     FORM THE INNER PRODUCT                                            QCHOL    174
      CALL HOTDOT (LD1,1,X,A(LARK),S,LEAST,INC,1)                       QCHOL    175
      LAG = LD                                                          QCHOL    176
      I = LD                                                            QCHOL    177
      INC = L(I) - 1                                                    QCHOL    178
  240 S = -X(I)                                                         QCHOL    179
      LEAST  =  MAXOF(I-INC,LOW)                                        QCHOL    180
      IF (I - LAST) 250,250,260                                         QCHOL    181
  250 INC = L(I+1) - 1                                                  QCHOL    182
      CALL HOTDOT (LD1,1,X,A(LARK),S,LEAST,INC,3)                       QCHOL    183
      X(I) = -S/A(II)                                                   QCHOL    184
      I = I + 1                                                         QCHOL    185
      II = II + L(I)                                                    QCHOL    186
      GO TO 240                                                         QCHOL    187
  260 IF (KEY) 310,270,310                                              QCHOL    188
C   KEEP TRACK OF MOST SERIOUS CANCELLATION. QUIT IF IT GETS TOO BAD.   QCHOL    189
  270 ORIG   =  ABSF(T)                                                 QCHOL    190
      KJ = LOST                                                         QCHOL    191
      DO 280  J = LOW,K                                                 QCHOL    192
      KJ = KJ + 1                                                       QCHOL    193
  280 A(KJ) = X(J)                                                      QCHOL    194
      CALL HOTDOT (LD1,1,X,A(LARK),S,LEAST,INC,3)                       QCHOL    195
      T        = -S                                                     QCHOL    196
      IF (T .LE. ORIG*1.E-7) GO TO 930                                  QCHOL    197
      IF (T / ORIG .GE. WORST) GO TO 290                                QCHOL    198
      WORST = T / ORIG                                                  QCHOL    199
      INDEX = K                                                         QCHOL    200
  290 X(I)   =  SQRTF(T)                                                QCHOL    201
      A(II) = X(I)                                                      QCHOL    202
      LOST = LEST                                                       QCHOL    203
      DO 300  J = KP1,M                                                 QCHOL    204
  300 X(J) = 0.                                                         QCHOL    205
      CALL PUTROW (ML,1,X,M)                                            QCHOL    206
      GO TO 320                                                         QCHOL    207
  310 CALL PUTROW (MO,1,X,K)                                            QCHOL    208
  320 CONTINUE                                                          QCHOL    209
C                                                                       QCHOL    210
C                                                                       QCHOL    211
C ERROR MESSAGES                                                        QCHOL    212
C                                                                       QCHOL    213
      NU = LAST + 1                                                     QCHOL    214
      GO TO 990                                                         QCHOL    215
  920 NIX = 42                                                          QCHOL    216
      LAFT=LINES-KOUNT                                                  QCHOL    217
      IF(LAFT.LT.3) KOUNT=LINES                                         QCHOL    218
      CALL TITLES(2)                                                    QCHOL    219
      WRITE(ITAPEW,4) NIX                                               QCHOL    220
      WRITE(ITAPEW,921) K                                               QCHOL    221
      KOUNT=KOUNT+3                                                     QCHOL    222
      GO TO 980                                                         QCHOL    223
  930 NIX = 43                                                          QCHOL    224
  980 JND=K                                                             QCHOL    225
  990 IF (WORST .GE. .001) GO TO 1000                                   QCHOL    226
      I       = -ALOGCF(WORST)                                          QCHOL    227
      LAFT=LINES-KOUNT                                                  QCHOL    228
      IF(LAFT.LT.2) KOUNT=LINES                                         QCHOL    229
```

```
            CALL TITLES(2)                                                  QCHOL    230
            WRITE(ITAPEW,10) I,INDEX,NAME                                   QCHOL    231
            KOUNT=KOUNT+2                                                   QCHOL    232
       1000 IF (NIX.EQ.43) WRITE(ITAPEW,20) K,NAME,T,(X(J),J=1,K)           QCHOL    233
            CALL MESAGE (2, 5, 5HQCHOL)                                     QCHOL    234
      C                                                                     QCHOL    235
      C FORMAT STATEMENTS                                                   QCHOL    236
      C                                                                     QCHOL    237
          4 FORMAT(/,10X,10(1H*),6HERROR ,I4,10(1H*))                       QCHOL    238
        921 FORMAT(10X, 7HD.O.F. ,I5)                                       QCHOL    239
         10 FORMAT(/,10X,    27HPROBABLE LOSS OF ACCURACY (,I2,             QCHOL    240
          1 24H OR MORE DIGITS) AT STEP,I4,    21H IN SPLITTING MATRIX ,2A4) QCHOL   241
         20 FORMAT(/,10X,    15HFAILURE AT STEP,I4,                         QCHOL    242
          1 37H IN CHOLESKY FACTORIZATION OF MATRIX ,2A4,                   QCHOL    243
          2 50H WHICH MAY NOT BE POSITIVE DEFINITE (AS REQUIRED).,/,10X,    QCHOL    244
          3 56HTHE CRITICAL ROW IS PRINTED BELOW. LARGE ELEMENT BEFORE ,    QCHOL    245
          4 44HDIAGONAL MAY INDICATE A BAD PRINCIPAL MINOR.,/,10X,          QCHOL    246
          5 55HVARIABLE T IS DIAGONAL ELEMENT MINUS SUM OF SQUARES OF ,     QCHOL    247
          6 58HEARLIER ELEMENTS. IT SHOULD BE POSITIVE AND NOT TOO SMALL.,  QCHOL    248
          7 //,10X, 3HT= ,1PE14.6,                                          QCHOL    249
          8 //,10X,    11HROW FOLLOWS,                                      QCHOL    250
          9 //,(10X,1P8E15.6))                                              QCHOL    251
       2001 FORMAT (10X, 34HLOWER TRIANGLE OF STIFFNESS MATRIX)             QCHOL    252
       2002 FORMAT (10X, 5(2X, 5A4))                                        QCHOL    253
       2003 FORMAT (10X, 5(2I5,1P1E12.4))                                   QCHOL    254
       2005 FORMAT (10X, 36HLOWER TRIANGLE OF FLEXIBILITY MATRIX)           QCHOL    255
      C                                                                     QCHOL    256
            RETURN                                                          QCHOL    257
            END                                                             QCHOL    258
```

SYMBOLIC REFERENCE MAP (R=3)

```
ENTRY POINTS      DEF LINE      REFERENCES
    3  QCHOL         39           256

VARIABLES      SN  TYPE            RELOCATION
    0  A           REAL       ARRAY    F.P.      REFS      50      174      182      183      194
                                              DEFINED      39      193      201
  765  DUMMY     * REAL                          REFS     102
    3  H           REAL               PROBSZ     REFS      53
 1015  HEAD        REAL       ARRAY              REFS      48      139  DEFINED       85
 1046  HOLD        REAL       ARRAY              REFS      48       85  DEFINED       82
 1002  I           INTEGER                       REFS     169      177      178      179      180      181      183
                                                  184     185      200      201      230  DEFINED      168      176
                                                  184     226
    2  IBANDW      INTEGER            PROBSZ     REFS      53
    7  IDEBUG      INTEGER            PROBSZ     REFS      53
  754  IH          INTEGER                       REFS    2*85      139  DEFINED       83      139
 1003  II          INTEGER                       REFS     183      185      201  DEFINED      171      185
 1006  INC         INTEGER                       REFS     174      179      182      194  DEFINED      177      181
 1011  INDEX       INTEGER                       REFS     230  DEFINED      199
    2  ITAPEP      INTEGER            COMRWP     REFS      54
```

```
VARIABLES       SN  TYPE              RELOCATION
     7  ITAPET      INTEGER                CTABLE      REFS        58
     1  ITAPEW      INTEGER                COMRWP      REFS        54       138   I/O REFS      136       137       139       143
                                                        219       220       230       232
   771  J           INTEGER                            REFS       117       118       122       124       144       193       204
                                                        232   DEFINED       113       117       191       203       232
   772  JCOLS       INTEGER                            REFS       118       124       144   DEFINED       114
   774  JCU         INTEGER                            REFS       143   DEFINED       126
   755  JH          INTEGER                            REFS        85       139   DEFINED        84       139
  1013  JND       * INTEGER                         DEFINED       224
   763  K           INTEGER                            REFS       101       105       114       121       128       151     2*152
                                                        154       157       158       191       199       207       220       224
                                                      2*232   DEFINED       100
     7  KBPAGE      INTEGER                CLIST       REFS        56
     0  KEE         INTEGER                F.P.        REFS        89       106   DEFINED        39
     0  KEY         INTEGER                F.P.        REFS       153       187   DEFINED        39        92       156
  1010  KJ          INTEGER                            REFS       192       193   DEFINED       190       192
     4  KLABEL      INTEGER                CLIST       REFS        56
     0  KLISTM      INTEGER                F.P.        REFS        90       111   DEFINED        39
   773  KOL         INTEGER                            REFS       120       121       122       123       125       126     3*143
                                                    DEFINED       115       120       143
   756  KOLUMN      INTEGER                            REFS       125       139   DEFINED        87        88
     0  KORE        INTEGER                F.P.        REFS       155   DEFINED        39
     0  KOUNT       INTEGER                CLIST       REFS        56       135       140       142       216       221       227
                                                        231   DEFINED        90       140       142       217       221       228
                                                        231
    11  KOUNTH      INTEGER                CLIST       REFS        56       135
    12  KOUNTI      INTEGER                CLIST       REFS        56
   766  KOUNTO      INTEGER                            REFS       102       103       104       105
     1  KPAGE       INTEGER                CLIST       REFS        56
   764  KP1         INTEGER                            REFS       158       203   DEFINED       101
     0  KREPOR      INTEGER                REPORT      REFS        60        88
     0  KTABLE      INTEGER                CTABLE      REFS        58   DEFINED        80       128
     5  KTABLO      INTEGER                CTABLE      REFS        58
     5  KTPAGE      INTEGER                CLIST       REFS        56
     0  KTYPE       INTEGER                F.P.        REFS       129       132       136       137   DEFINED        39
     4  K1          INTEGER                PROBSZ      REFS        53
     0  L           INTEGER       ARRAY    F.P.        REFS        50       154       158       169       177       181       185
                                                    DEFINED        39       152
  1012  LAFT        INTEGER                            REFS       217       228   DEFINED       216       227
   762  LAG         INTEGER                            REFS       161       162       167       168   DEFINED        95       163
                                                        167       175
  1004  LARK        INTEGER                            REFS       174       182       194   DEFINED       172
   776  LAST        INTEGER                            REFS       180       213   DEFINED       157
  1001  LATE        INTEGER                            REFS       168   DEFINED       162       166
  1053  LCOL        INTEGER       ARRAY                REFS        49       143   DEFINED       122
   770  LD          INTEGER                            REFS       105       151       152       160       161       163       166
                                                        175       176   DEFINED       159
   761  LDLD        INTEGER                            REFS       164       169       170       171       172
                                                    DEFINED        94       164       169       170
  1000  LD1         INTEGER                            REFS       172       174       182       194   DEFINED       160
  1005  LEAST       INTEGER                            REFS       174       182       194   DEFINED       179
   775  LEST        INTEGER                            REFS       155       202   DEFINED       154
     2  LINES       INTEGER                CLIST       REFS        56        90       216       217       227       228
    10  LINESG      INTEGER                CLIST       REFS        56
     3  LINEST      INTEGER                CLIST       REFS        56
   767  LOC         INTEGER                            REFS       104       105       116       119       123
                                                    DEFINED       103       112       116
```

```
VARIABLES      SN  TYPE          RELOCATION
   760  LOST       INTEGER                        REFS       154      190    DEFINED       93      202
   777  LOW        INTEGER                        REFS       159      179      191    DEFINED      158
  1060  LROW       INTEGER     ARRAY              REFS        49      143    DEFINED      121
     0  M          INTEGER              F.P.      REFS        91      100      203      205    DEFINED       39
     0  MI         INTEGER              F.P.      REFS       102      104    DEFINED       39
     6  MILSUM     INTEGER              PROBSZ    REFS        53
     0  ML         INTEGER              F.P       REFS       205    DEFINED       39
     0  MO         INTEGER              F.P.      REFS       207    DEFINED       39
   757  MP2        INTEGER                        REFS       103    DEFINED       91
     5  M1         INTEGER              PROBSZ    REFS        53
     0  M2         INTEGER              PROBSZ    REFS        53
     1  N          INTEGER              PROBSZ    REFS        53
     0  NAME       INTEGER     ARRAY    F.P.      REFS        50      230      232    DEFINED       39
     3  NCOLS      INTEGER              CTABLE    REFS        58    DEFINED       79
     4  NCOLST     INTEGER              CTABLE    REFS        58
     0  NIX        INTEGER              F.P.      REFS       219      232    DEFINED       39      215      223
     0  NO         INTEGER              CONSTS    REFS        55      111
     6  NPAGE      INTEGER              CLIST     REFS        56
     6  NPAGEA     INTEGER              CTABLE    REFS        58
     1  NPASS      INTEGER              CTABLE    REFS        58
     2  NROWS      INTEGER              CTABLE    REFS        58    DEFINED       78
     0  NU         INTEGER              F.P.      REFS        77       95      100      150      159
                                                DEFINED       39      213
  1007  ORIG       REAL                           REFS       196      197      198    DEFINED      189
  1065  ROW        REAL        ARRAY              REFS        51      143    DEFINED      123
  1014  S          REAL                           REFS        62      174      182      183      194      195
                                                DEFINED      178
  1014  T          REAL                           REFS        62      189      196      197      198      200      232
                                                DEFINED      195
     0  WORST      REAL                 F.P.      REFS       197      225      226    DEFINED       39      198
     0  X          REAL        ARRAY    F.P.      REFS        50      104    2*105      119      123      174      178
                                                   182       193      194      201      205      207      232
                                                DEFINED       39      183      200      204
     1  YES        INTEGER              CONSTS    REFS        42       55       88       90
        VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS            TYPE    ARGS         REFERENCES
        ALOG10     REAL         1 LIBRARY    226
        GETROW                  4            102      104
        HOTDOT                  8            174      182      194
        MESAGE                  3             76      233
        PLB                     3            138
        PROGNA                  2             86
        PTABLE                  3            129      132
        PUTROW                  4            205      207
        SQRT       REAL         1 LIBRARY    200
        TITLES                  1            127      218      229
        UNPACK                  5            105

INLINE FUNCTIONS     TYPE    ARGS      DEF LINE   REFERENCES
        ABS        REAL         1  INTRIN           189
        ABSF       REAL         1    SF        66   189
        ALOGCF     REAL         1    SF        67   226
        IABS       INTEGER      1  INTRIN           170
        IABSF      INTEGER      1    SF        68   170
        MAXO       INTEGER      0  INTRIN           159      179
        MAXOF      INTEGER      2    SF        69   159      179
```

```
INLINE FUNCTIONS   TYPE    ARGS         DEF LINE  REFERENCES
       MINOF      INTEGER   2     SF        70
       SQRTF      REAL      1     SF        71        200

STATEMENT LABELS                 DEF LINE   REFERENCES
  623   4        FMT               237        219
  633   10       FMT               239        230
    0   12                          85         83        84
  646   20       FMT               241        232
  104   52                         115        144
  105   55                         116        119       125
  112   60                         120        118      2*119
  123   65                         126        124
  165   70                         141        135
   15   80                          81         77
  207   91                         150        106
    0   100          INACTIVE      151        150
   46   101                         91         89
  207   115                        145        111
    0   120          INACTIVE      152        151
  214   130                        153      2*150
    0   140          INACTIVE      154        153
    0   150          INACTIVE      156        155
  223   160                        157      2*155
  225   170                        158      2*153
    0   180          INACTIVE      161
    0   190          INACTIVE      162        161
  240   200                        166        161
  243   210                        168        165
    0   220                        169        168
  254   230                        171        161
  266   240                        178        186
    0   250          INACTIVE      181      2*180
  311   260                        187        180
    0   270          INACTIVE      189        187
    0   280                        193        191
  343   290                        200        197
    0   300                        204        203
  363   310                        207      2*187
  367   320                        208        100       206
  374   920                        215      2*151
  630   921      FMT               238        220
  411   930                        223        196
  413   980                        224        222
  415   990                        225        214
  433   1000                       232        225
  720   2001     FMT               251        136
  726   2002     FMT               252        139
  731   2003     FMT               253        143
  734   2005     FMT               254        137

LOOPS  LABEL    INDEX    FROM-TO    LENGTH    PROPERTIES
   16   12      IH        83  85       14B                NOT INNER
   24   12      JH        84  85        3B     INSTACK
   55   320     K        100 208      315B                EXT REFS    EXITS    NOT INNER
  171           KOL      143 143       12B                EXT REFS
  247   220     I        168 169        3B     INSTACK
  323   280     J        191 193        2B     INSTACK
```

```
LOOPS  LABEL     INDEX     FROM-TO     LENGTH    PROPERTIES
  353  300       J          203 204        2B     INSTACK

COMMON BLOCKS    LENGTH     MEMBERS - BIAS NAME(LENGTH)
       PROBSZ        8                0 M2      (1)          1 N       (1)          2 IBANDW (1)
                                      3 H       (1)          4 K1      (1)          5 M1     (1)
                                      6 MILSUM  (1)          7 IDEBUG  (1)
       COMRWP        3                0 ITAPER  (1)          1 ITAPEW  (1)          2 ITAPEP (1)
       CONSTS        2                0 NO      (1)          1 YES     (1)
       CLIST        11                0 KOUNT   (1)          1 KPAGE   (1)          2 LINES  (1)
                                      3 LINEST  (1)          4 KLABEL  (1)          5 KTPAGE (1)
                                      6 NPAGE   (1)          7 KBPAGE  (1)          8 LINESG (1)
                                      9 KOUNTH  (1)         10 KOUNTI  (1)
       CTABLE        8                0 KTABLE  (1)          1 NPASS   (1)          2 NROWS  (1)
                                      3 NCOLS   (1)          4 NCOLST  (1)          5 KTABLO (1)
                                      6 NPAGEA  (1)          7 ITAPET  (1)
       REPORT        1                0 KREPOR  (1)

EQUIV CLASSES    LENGTH     MEMBERS - BIAS NAME(LENGTH)
       S             1                0 T       (1)

STATISTICS
  PROGRAM LENGTH                 1200B      640
  CM LABELED COMMON LENGTH         41B       33
          52000B CM USED
```

```
C45700. SUB. HOTDOT (INNER PRODUCT OF TWO VECTORS)                     * HOTDOT     2
C                                                                        HOTDOT     3
C*********************************************************************** HOTDOT     4
C                                                                      * HOTDOT     5
C***  SUBROUTINE HOTDOT (LAST  ,INC   ,FIX   ,VARY  ,S     ,LOW        * HOTDOT     6
C                         ,JUMP  ,KENTRY)                              * HOTDOT     7
C                                                                      * HOTDOT     8
C***  OBJECTIVE  ******************************************************* HOTDOT     9
C     ---------                                                        * HOTDOT    10
C     FORMS THE INNER PRODUCT OF TWO VECTORS.                          * HOTDOT    11
C                                                                      * HOTDOT    12
C***  INPUT/OUTPUT  **************************************************** HOTDOT    13
C     ------------                                                     * HOTDOT    14
C     INPUT CONSISTS OF LOCATION OF THE VECTORS AND ASSOCIATED LENGTHS.* HOTDOT    15
C     OUTPUT IS THE INNER PRODUCT.                                     * HOTDOT    16
C                                                                      * HOTDOT    17
C***  SUMMARY OF SYMBOLS  ********************************************** HOTDOT    18
C     ------------------                                               * HOTDOT    19
C                                                                      * HOTDOT    20
C***  ERROR MESSAGES  ************************************************** HOTDOT    21
C     --------------                                                   * HOTDOT    22
C     NONE.                                                            * HOTDOT    23
C                                                                      * HOTDOT    24
C*********************************************************************** HOTDOT    25
C                                                                        HOTDOT    26
      SUBROUTINE HOTDOT (LAST,INC,FIX,VARY,S,LOW,JUMP,KENTRY)            HOTDOT    27
C                                                                        HOTDOT    28
CIBM  BEGINNING OF TYPE STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS HOTDOT    29
C     DOUBLE PRECISION S                                                 HOTDOT    30
CIBM  ENDING OF TYPE STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS    HOTDOT    31
C                                                                        HOTDOT    32
      DIMENSION FIX(1)                                                   HOTDOT    33
      DIMENSION VARY(1)                                                  HOTDOT    34
C                                                                        HOTDOT    35
      GO TO (10,20,30), KENTRY                                           HOTDOT    36
C                                                                        HOTDOT    37
   10 CONTINUE                                                           HOTDOT    38
      INDEX  =  1                                                        HOTDOT    39
      KEY    =  0                                                        HOTDOT    40
      GO TO 99                                                           HOTDOT    41
C                                                                        HOTDOT    42
   20 CONTINUE                                                           HOTDOT    43
      INDEX  =  1                                                        HOTDOT    44
      KEY    = -1                                                        HOTDOT    45
      GO TO 99                                                           HOTDOT    46
C                                                                        HOTDOT    47
   30 CONTINUE                                                           HOTDOT    48
      IF (LOW - LAST) 50, 50, 120                                        HOTDOT    49
   50 IJ     =  INDEX + LOW - 1                                          HOTDOT    50
      IF (KEY) 200, 100, 200                                             HOTDOT    51
  100 DO 110 J=LOW,LAST                                                  HOTDOT    52
      S      =  S + VARY(IJ)*FIX(J)                                      HOTDOT    53
  110 IJ     =  IJ + 1                                                   HOTDOT    54
  120 INDEX  =  INDEX + JUMP                                             HOTDOT    55
      LAST   =  LAST + INC                                               HOTDOT    56
      GO TO 99                                                           HOTDOT    57
  200 DO 210 J=LOW,LAST                                                  HOTDOT    58
```

```
                  FIX(J) =  FIX(J) + VARY(IJ)*S                                   HOTDOT      59
              210 IJ      =  IJ + 1                                               HOTDOT      60
 60               GO TO 120                                                       HOTDOT      61
            C                                                                     HOTDOT      62
               99 CONTINUE                                                        HOTDOT      63
            C                                                                     HOTDOT      64
                  RETURN                                                          HOTDOT      65
 65               END                                                             HOTDOT      66
```

```
CARD NR. SEVERITY  DETAILS    DIAGNOSIS OF PROBLEM

    35     I                 AN IF STATEMENT MAY BE MORE EFFICIENT THAN A 2 OR 3 BRANCH COMPUTED GO TO STATEMENT.
```

```
        SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS      DEF LINE      REFERENCES
    3  HOTDOT         26          64

VARIABLES     SN  TYPE            RELOCATION
    0  FIX        REAL        ARRAY     F.P.       REFS         32         52         58    DEFINED         26         58
   71  IJ         INTEGER                          REFS         52         53         58         59    DEFINED         49         53
                                                       59
    0  INC        INTEGER               F.P.       REFS         55    DEFINED         26
   67  INDEX      INTEGER                          REFS         49         54    DEFINED         38         43         54
   72  J          INTEGER                          REFS         52       2*58    DEFINED         51         57
    0  JUMP       INTEGER               F.P.       REFS         54    DEFINED         26
    0  KENTRY     INTEGER               F.P.       REFS         35    DEFINED         26
   70  KEY        INTEGER                          REFS         50    DEFINED         39         44
    0  LAST       INTEGER               F.P.       REFS         48         51         55         57    DEFINED         26         55
    0  LOW        INTEGER               F.P.       REFS         48         49         51         57    DEFINED         26
    0  S          REAL                  F.P.       REFS         52         58    DEFINED         26         52
    0  VARY       REAL        ARRAY     F.P.       REFS         33         52         58    DEFINED         26

STATEMENT LABELS               DEF LINE    REFERENCES
   16  10                         37          35
   21  20                         42          35
   24  30                         47          35
    0  50          INACTIVE       49        2*48
   66  99                         62          40         45         56
    0  100         INACTIVE       51          50
    0  110                        53          51
   45  120                        54          48         60
   52  200                        57        2*50
    0  210                        59          57

LOOPS  LABEL     INDEX       FROM-TO      LENGTH     PROPERTIES
   40  110       J            51 53          4B        INSTACK
   61  210       J            57 59          3B        INSTACK
```

```
STATISTICS
  PROGRAM LENGTH              76B      62
          52000B CM USED
```

```
C45700, SUB. TRAN (TRANSPOSE OF MATRIX)                                 TRAN       2
C                                                                       TRAN       3
C*********************************************************************** TRAN       4
C                                                                     * TRAN       5
C***  SUBROUTINE TRAN    ********************************************** TRAN       6
C                                                                     * TRAN       7
C***  COMPUTER VERSION  *********************************************** TRAN       8
C     ----------------                                                * TRAN       9
C     IBM .... AS IS.                                                 * TRAN      10
C                                                                     * TRAN      11
C     CDC .... AS IS.                                                 * TRAN      12
C                                                                     * TRAN      13
C***  OBJECTIVE  ****************************************************** TRAN      14
C     ---------                                                       * TRAN      15
C     OBTAINS THE TRANSPOSE OF A MATRIX THAT MAY BE TOO LARGE TO FIT  * TRAN      16
C     IN CORE.                                                        * TRAN      17
C                                                                     * TRAN      18
C***  INPUT/OUTPUT  *************************************************** TRAN      19
C     ------------                                                    * TRAN      20
C     INPUT CONSISTS OF MATRIX TO BE TRANSPOSED. OUTPUT CONSISTS OF   * TRAN      21
C     THE TRANSPOSE ON A DIFFERENT TAPE DRIVE.                        * TRAN      22
C                                                                     * TRAN      23
C***  SUMMARY OF SYMBOLS  ********************************************* TRAN      24
C     ------------------                                              * TRAN      25
C                                                                     * TRAN      26
C***  ERROR MESSAGES  ************************************************* TRAN      27
C     --------------                                                  * TRAN      28
C     NONE.                                                           * TRAN      29
C                                                                     * TRAN      30
C*********************************************************************** TRAN      31
C                                                                       TRAN      32
      SUBROUTINE TRAN (LSIZE,BUFFER,IBUFF,MATRIX,MANS,MTEMP1,MTEMP2     TRAN      33
     1               ,JUNITF,NAMET)                                     TRAN      34
C                                                                       TRAN      35
C                                                                       TRAN      36
      DIMENSION BUFFER(LSIZE)                                           TRAN      37
      DIMENSION IPOS(20)                                                TRAN      38
      DIMENSION IBUFF(LSIZE)                                            TRAN      39
      DIMENSION KFMIG(6)                                                TRAN      40
      DIMENSION NAME (2)          ,NAME1(2)          ,NAMET(2)          TRAN      41
C                                                                       TRAN      42
      COMMON /CLIST / KOUNT ,KPAGE ,LINES ,LINEST,KLABEL,KTPAGE,NPAGE   TRAN      43
     1               ,KBPAGE,LINESG,KOUNTH,KOUNTI                       TRAN      44
      COMMON /FILE  / IPOS                                              TRAN      45
C                                                                       TRAN      46
C                                                                       TRAN      47
C                                                                       TRAN      48
C INITIAL CONDITIONS                                                    TRAN      49
      CALL PROGNA (4H(TRA,4HN  ))                                       TRAN      50
      CALL MESAGE (1,25,25HTRAN - TRANSPOSE A MATRIX)                   TRAN      51
      CALL TIMEB (11,11HFROM TRAN  )                                    TRAN      52
      ISIZE=LSIZE                                                       TRAN      53
      NFMAT  =  IPOS(MATRIX)                                            TRAN      54
      CALL GEDLAB (8HTRAN  01,MATRIX,NAME  ,NFMAT ,IROW,ICOL)           TRAN      55
      IF (MATRIX .NE. JUNITF) GO TO 1                                   TRAN      56
      CALL GETROW (MATRIX,1,NIGEO,1)                                    TRAN      57
```

```
      CALL GETROW (MATRIX,1,BUFFER,NSGEO)
    1 CONTINUE
      CALL DVALUE (BUFFER,0.0,LSIZE)
      ASSIGN 24 TO IREAD
      ASSIGN 70 TO IWRITE
      JROW=1
      ISTART=IROW+1
      NROW=0
      IO=MTEMP1+MTEMP2
      MOUT=MTEMP1
      LOCEMP=ISIZE-IROW
      INDEX=ISTART
C
C
C BEGIN READING ROWS OF THE MATRIX. NOTE THAT WHEN THE I/O UNITS
C MATRIX AND JUNITF ARE THE SAME, ADDITIONAL INFORMATION MUST BE READ.
C
    2 IF (MATRIX .NE. JUNITF) GO TO 10
      KFMIGC = 0
      CALL GETROW (MATRIX,1,KFMIG,6)
      KFMIGX = 0
      DO 7 KA=1,6
    7 KFMIGX = KFMIGX + (KFMIG(KA) - 1)
   10 CONTINUE
      IF (MATRIX .NE. JUNITF) GO TO 11
      KFMIGC = KFMIGC + 1
      IF (KFMIGC .GT. KFMIGX) GO TO 2
   11 CONTINUE
C
C
      CALL GETROW(MATRIX,-1,DUMMY,ICOUNT)
      IF (LOCEMP-ICOUNT-3) 20,12,12
   12 INX=INDEX+2
      CALL GETROW(MATRIX,0,BUFFER(INX),ICOUNT)
      ICT2=ICOUNT+2
      LOCEMP=LOCEMP-ICT2
      IBUFF(INDEX+1)=-INX
      IBUFF(INDEX)=INDEX+ICT2
      INDEX=IBUFF(INDEX)
      NROW=NROW+1
      IF (NROW-IROW) 10,20,20
   20 KROW=NROW
C          HAVE READ IN ALL OR PART OF MATRIX, NOW TRANSPOSE IT
      IF (KROW-IROW) 4,6, 6
    4 NFMOUT =  IPOS(MOUT)
      CALL PUDLAB (8HTRAN  O1,MOUT   ,NAME   ,NFMOUT,ICOL,IROW)
      GO TO 8
    6 ASSIGN 80 TO IWRITE
      NFMANS =  IPOS(MANS)
      CALL PUDLAB (8HTRAN  O2,MANS   ,NAMET  ,NFMANS,ICOL,IROW)
    8    CONTINUE
      NCOL=0
   22 NCOL=NCOL+1
      GO TO IREAD,(24,26)
   24 DO 25 J=1,IROW
   25 BUFFER(J)=0.
      GO TO 30
```

```
   26 CALL GETROW(MIN.1,BUFFER.IROW)                                  TRAN     116
   30 INDEX=ISTART                                                    TRAN     117
      DO 65 NROW=JROW,KROW                                            TRAN     118
      INX=INDEX+2                                                     TRAN     119
      IPT=IBUFF(INDEX+1)                                              TRAN     120
      IF (IPT) 55. 35,35                                              TRAN     121
   35     CONTINUE                                                    TRAN     122
C         IPT IS POINTING TO DATA                                     TRAN     123
      BUFFER(NROW)=BUFFER(IPT)                                        TRAN     124
      IPT=IPT+1                                                       TRAN     125
      JPT=IBUFF(INX)                                                  TRAN     126
      IF (JPT) 40, 50,50                                              TRAN     127
   40     CONTINUE                                                    TRAN     128
C         JPT IS POINTING TO A COUNT OTHER THAN THE FIRST             TRAN     129
      JPT=-JPT                                                        TRAN     130
   42 IF (IPT.LE.(JPT+IBUFF(JPT))) GO TO 45                           TRAN     131
   43 IBUFF(INDEX+1)=-IPT                                             TRAN     132
      IBUFF(INX)=-IPT                                                 TRAN     133
      GO TO 65                                                        TRAN     134
   45 IBUFF(INDEX+1)=IPT                                              TRAN     135
      GO TO 65                                                        TRAN     136
   50   , CONTINUE                                                    TRAN     137
C         JPT IS FIRST COUNT                                          TRAN     138
      JPT=INX                                                         TRAN     139
      GO TO 42                                                        TRAN     140
   55     CONTINUE                                                    TRAN     141
C         IPT IS POINTING TO A COUNT                                  TRAN     142
      IPT=-IPT                                                        TRAN     143
      IF (IBUFF(IPT)) 58, 62,62                                       TRAN     144
   58 BUFFER(NROW)=0                                                  TRAN     145
      IBUFF(IPT)=IBUFF(IPT)+1                                         TRAN     146
      IF (IBUFF(IPT)) 65,60, 60                                       TRAN     147
   60 IPT=IPT+1                                                       TRAN     148
      GO TO 43                                                        TRAN     149
   62 IF (IPT.NE.INX) IBUFF(INX)=-IPT                                 TRAN     150
      IPT=IPT+1                                                       TRAN     151
      GO TO 35                                                        TRAN     152
   65 INDEX=IBUFF(INDEX)                                              TRAN     153
C         LOOP ENDING AT 65 GENERATES ALL OR PART OF A ROW OF ANSWER  TRAN     154
      GO TO IWRITE,(70,80)                                            TRAN     155
   70 CALL PUTROW(MOUT,1,BUFFER,IROW)                                 TRAN     156
      IF (NCOL.LT.ICOL) GO TO 22                                      TRAN     157
C         WRITING AN END OF FILE AND USING FILTAP MAY BE INEFFICIENT  TRAN     158
      IF(JROW.GT.1) CALL DCLOSE(MIN)                                  TRAN     159
      MIN=MOUT                                                        TRAN     160
      ASSIGN 26 TO IREAD                                              TRAN     161
      MOUT=IO-MIN                                                     TRAN     162
      NFMIN  =  IPOS(MIN)                                             TRAN     163
      CALL GEDLAB (8HTRAN  O2,MIN   ,NAME1 ,NFMIN ,J   ,L   )         TRAN     164
      JROW=KROW+1                                                     TRAN     165
      NROW=KROW                                                       TRAN     166
      INDEX=ISTART                                                    TRAN     167
      LOCEMP=ISIZE-IROW                                               TRAN     168
      GO TO 12                                                        TRAN     169
   80     CONTINUE                                                    TRAN     170
      CALL PUTROW(MANS,1,BUFFER,IROW)                                 TRAN     171
      IF (NCOL.LT.ICOL) GO TO 22                                      TRAN     172
```

```
EXTERNALS          TYPE    ARGS        REFERENCES
      GETROW                 4              36

STATEMENT LABELS              DEF LINE   REFERENCES
    0  100          INACTIVE     35          34
    0  110                       36          35
   20  120                       37         2*34

LOOPS  LABEL     INDEX      FROM-TO     LENGTH    PROPERTIES
   11  110       I             35 36        7B               EXT REFS

STATISTICS
  PROGRAM LENGTH                  35B       29
         52000B CM USED
```

```
      C45700. SUB. QPASS (DUMMY READ LOWER TRIANGLE OF DECOMPOSITION OF STIFF) QPASS       2
      C                                                                        QPASS       3
      C*********************************************************************** QPASS       4
      C                                                                      * QPASS       5
      C***   SUBROUTINE QPASS  (NU    ,ML    ,T) **************************** QPASS       6
      C                                                                      * QPASS       7
      C***   OBJECTIVE  ************************************************** QPASS       8
      C      ---------                                                       * QPASS       9
      C      DUMMY READS OVER THE REQUIRED NUMBER OF ROWS OF THE LOWER       * QPASS      10
      C      TRIANGLE DECOMPOSITION OF THE STIFFNESS MATRIX TO AID IN ZONING * QPASS      11
      C      FOR THE FORWARD SOLUTION.                                       * QPASS      12
      C                                                                      * QPASS      13
      C***   INPUT/OUTPUT  *********************************************** QPASS      14
      C      ------------                                                    * QPASS      15
      C      THIS SUBROUTINE USES THE STARTING POINT NU FOR THE ZONING OF THE * QPASS      16
      C      FORWARD SOLUTION, AND A SCRATCH ARRAY T INTO WHICH A ROW AT A    * QPASS      17
      C      TIME OF THE LOWER TRIANGLE, RESIDING ON ML, IS TO BE DUMMY READ. * QPASS      18
      C                                                                      * QPASS      19
      C***   SUMMARY OF SYMBOLS  ******************************************* QPASS      20
      C      ------------------                                              * QPASS      21
      C                                                                      * QPASS      22
      C***   ERROR MESSAGES  *********************************************** QPASS      23
      C      --------------                                                  * QPASS      24
      C      NONE.                                                             QPASS      25
      C                                                                      * QPASS      26
      C*********************************************************************** QPASS      27
      C                                                                        QPASS      28
            SUBROUTINE QPASS(NU,ML,T)                                          QPASS      29
      C                                                                        QPASS      30
      C                                                                        QPASS      31
            DIMENSION T(1)                                                     QPASS      32
      C                                                                        QPASS      33
            NEW = NU - 1                                                       QPASS      34
            IF (NEW) 120,120,100                                               QPASS      35
        100 DO 110  I = 1,NEW                                                  QPASS      36
        110 CALL GETROW(ML,O,T,N)                                              QPASS      37
        120 RETURN                                                             QPASS      38
            END                                                                QPASS      39
```

```
     SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS     DEF LINE     REFERENCES
   3  QPASS          28          37

VARIABLES     SN  TYPE           RELOCATION
   30  I       *  INTEGER                        DEFINED     35
    O  ML         INTEGER             F.P.         REFS      36    DEFINED      28
   31  N       *  INTEGER                          REFS      36
   27  NEW        INTEGER                          REFS      34          35    DEFINED      33
    O  NU         INTEGER             F.P          REFS      33    DEFINED      28
    O  T          REAL        ARRAY   F.P          REFS      31          36    DEFINED      28
```

```
STATEMENT LABELS                DEF LINE   REFERENCES
    0  200        INACTIVE         90         89
  215  220                         92         62        2*89
    0  230        INACTIVE         94

LOOPS  LABEL     INDEX       FROM-TO     LENGTH    PROPERTIES
   20  100       I             48 51        21B              EXT REFS  NOT INNER
   33  100       J             50 51         2B     INSTACK
   42  140       K             52 59        17B              NOT INNER
   46  130       I             54 58        10B        OPT     EXITS
   65  220       I             62 92       133B              EXT REFS  NOT INNER
  102  146       J             65 66         2B     INSTACK
  142  180       K             75 84        30B              EXT REFS
  200  190       K             85 86         2B     INSTACK

STATISTICS
  PROGRAM LENGTH                  404B      260
          52000B CM USED
```

```
VARIABLES      SN  TYPE            RELOCATION
  307  JOLT        INTEGER                         REFS        88    DEFINED        47        91
  312  K           INTEGER                         REFS        53         55        56        76        77        83      2*86
                                                DEFINED        52         75        85
  316  KOUNT       INTEGER                         REFS        67         68        69        70
    O  L           INTEGER    ARRAY      F.P.      REFS        36         53        77   DEFINED        29        56
  306  LAST        INTEGER                         REFS        63         81        89        93   DEFINED        46
  305  LATE        INTEGER                         REFS        46         74        78   DEFINED        45
  320  LEAD        INTEGER                         REFS        70         74
  323  LEAST       INTEGER                         REFS        72         79   DEFINED        78
  326  LK          INTEGER                         REFS        78    DEFINED        77
  317  LOC         INTEGER                         REFS        69         70   DEFINED        68
  325  LOW         INTEGER                         REFS        78    DEFINED        74
    O  M           INTEGER               F.P.      REFS        43         53        62   DEFINED        29
  304  MADZ        INTEGER                         REFS        46         48        54   DEFINED        44
    O  MI          INTEGER               F.P.      REFS        49         64   DEFINED        29
    O  MIDZ        INTEGER               F.P.      REFS        36         44        71        72        79
                                                DEFINED        29
    O  ML          INTEGER               F.P.      REFS        67         69   DEFINED        29
    O  MO          INTEGER               F.P.      REFS        90    DEFINED        29
  303  MP2         INTEGER                         REFS        68    DEFINED        43
    O  MZ          INTEGER               F.P.      REFS        60    DEFINED        29
    O  N           INTEGER               F.P.      REFS        49         50        52        64        65        75        85
                                                     87   DEFINED         29
    O  NU          INTEGER               F.P.      REFS        45         62        72        79   DEFINED        29        93
  327  R           REAL                            REFS        82         83   DEFINED        80        82
  322  S           REAL                            REFS        72         79        80   DEFINED        76
    O  T           REAL       ARRAY      F.P.      REFS        36         49        51        64        66        69      2*70
                                                     72        73         79        87   DEFINED        29        86
  324  X           REAL                            REFS        82    DEFINED        73
    O  Z           REAL       ARRAY      F.P.      REFS        36         55        72        76        79        86
                                                DEFINED        29         51        66        83

EXTERNALS          TYPE    ARGS       REFERENCES
       GETROW                4            49        64        67        69
       HOTDOT                8            72        79
       PUTROW                4            87
       UNPACK                5            70

INLINE FUNCTIONS   TYPE    ARGS         DEF LINE   REFERENCES
       MAXO        INTEGER   O  INTRIN                 74        78
       MAXOF       INTEGER   2    SF        40         74        78
       MINO        INTEGER   O  INTRIN                 71
       MINOF       INTEGER   2    SF        41         71

STATEMENT LABELS             DEF LINE   REFERENCES
    O  100                      51          48        50
    O  110       INACTIVE       54          53
    O  120       INACTIVE       56        2*55
   53  130                      58          54        55
   56  140                      59          52      2*53        57
    O  143       INACTIVE       64          63
    O  146                      66          65
  105  150                      67        2*63
    O  160       INACTIVE       82        2*81
  164  170                      83          81
    O  180                      84          75
    O  190                      86          85
```

```
      130 CONTINUE                                            QFOR    59
      140 CONTINUE                                            QFOR    60
          IT = MZ                                             QFOR    61
          IN = 1                                              QFOR    62
          DO 220  I = NU,M                                    QFOR    63
          IF (I - LAST) 150,150,143                           QFOR    64
      143 CALL GETROW (MI,1,T,N)                              QFOR    65
          DO 146  J = 1,N                                     QFOR    66
      146 Z(IN,J) = T(J)                                      QFOR    67
      150 CALL GETROW (ML,-1,DUMMY,KOUNT)                     QFOR    68
          LOC = MP2 - KOUNT                                   QFOR    69
          CALL GETROW (ML,O,T(LOC),KOUNT)                     QFOR    70
          CALL UNPACK(T(LOC),KOUNT,T,I,LEAD)                  QFOR    71
          IN1     =  MINOF(IN,MIDZ) - 1                       QFOR    72
          CALL HOTDOT (IN1,O,T(NU),Z,S,LEAST,MIDZ,1)          QFOR    73
          X = T(I)                                            QFOR    74
          LOW     =  MAXOF(O,LEAD-LATE) + 1                   QFOR    75
          DO 180  K = 1,N                                     QFOR    76
          S = -Z(IN,K)                                        QFOR    77
          LK = L(K)                                           QFOR    78
          LEAST   =  MAXOF(LOW,LK-LATE)                       QFOR    79
          CALL HOTDOT (IN1,O,T(NU),Z,S,LEAST,MIDZ,3)          QFOR    80
          R       = -S                                        QFOR    81
          IF (I - LAST) 160,160,170                           QFOR    82
      160 R = R / X                                           QFOR    83
      170 Z(IN,K) = R                                         QFOR    84
      180 CONTINUE                                            QFOR    85
          DO 190  K = 1,N                                     QFOR    86
      190 T(K) = Z(IN,K)                                      QFOR    87
          CALL PUTROW (IT,1,T,N)                              QFOR    88
          IN = IN + JOLT                                      QFOR    89
          IF (I - LAST) 220,200,220                           QFOR    90
      200 IT = MO                                             QFOR    91
          JOLT = O                                            QFOR    92
      220 CONTINUE                                            QFOR    93
          NU = LAST + 1                                       QFOR    94
      230 RETURN                                              QFOR    95
          END                                                 QFOR    96
```

SYMBOLIC REFERENCE MAP (R=3)

```
ENTRY POINTS      DEF LINE      REFERENCES
    3  QFOR           29           94

VARIABLES      SN  TYPE             RELOCATION
  315  DUMMY    *  REAL                          REFS       67
  310  I           INTEGER                       REFS       51       55       56       63       70       73       81
                                                   89  DEFINED       48       54       62
  314  IN          INTEGER                       REFS       66       71       76       83       86       88
                                              DEFINED       61       88
  321  IN1         INTEGER                       REFS       72       79  DEFINED       71
  313  IT          INTEGER                       REFS       87  DEFINED       60       90
  311  J           INTEGER                       REFS     2*51     2*66  DEFINED       50       65
```

```
C45700, SUB. QFOR  (COMPUTE THE FORWARD SOLUTION OF TRIANGULAR MATRIX)  QFOR   2
C                                                                       QFOR   3
C*********************************************************************** QFOR   4
C                                                                      * QFOR   5
C***   SUBROUTINE QFOR   (T     ,Z     ,L     ,M     ,N     ,NU        * QFOR   6
C                        ,MIDZ  ,ML    ,MZ    ,MI    ,MO)              * QFOR   7
C                                                                      * QFOR   8
C***   OBJECTIVE  ************************************************** QFOR   9
C      ---------                                                       * QFOR  10
C      COMPUTES THE FORWARD SOLUTION OF L TRANSPOSE TIMES X = L INVERSE * QFOR  11
C      TIMES Y = Z.  IT IS CALLED BY QFSOL EVERY TIME THAT THE AVAILABLE* QFOR  12
C      CORE MUST BE ZONED.                                             * QFOR  13
C                                                                      * QFOR  14
C***   INPUT/OUTPUT  *********************************************** QFOR  15
C      ------------                                                    * QFOR  16
C      THIS SUBROUTINE USES THE LOWER TRIANGLE DECOMPOSITION OF THE    * QFOR  17
C      TOTAL STIFFNESS MATRIX, RESIDING ON ML, AND THE APPLIED LOADS ON * QFOR  18
C      MY, TO PRODUCE THE INTERMEDIATE Z MATRIX ON MZ.                 * QFOR  19
C                                                                      * QFOR  20
C***   SUMMARY OF SYMBOLS  ***************************************** QFOR  21
C      ------------------                                              * QFOR  22
C                                                                      * QFOR  23
C***   ERROR MESSAGES  ********************************************* QFOR  24
C      --------------                                                  * QFOR  25
C      NONE.                                                             QFOR  26
C                                                                      * QFOR  27
C*********************************************************************** QFOR  28
C                                                                        QFOR  29
       SUBROUTINE QFOR (T,Z,L,M,N,NU,MIDZ,ML,MZ,MI,MO)                   QFOR  30
C                                                                        QFOR  31
C                                                                        QFOR  32
CIBM   BEGINNING OF TYPE STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS QFOR  33
C      DOUBLE PRECISION S                                                QFOR  34
CIBM   ENDING OF TYPE STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS   QFOR  35
C                                                                        QFOR  36
       DIMENSION T(1),Z(MIDZ,1),L(1)                                     QFOR  37
C                                                                        QFOR  38
C                                                                        QFOR  39
C FUNCTION DEFINITION                                                    QFOR  40
       MAXOF(I,J)   =  MAXO(I,J)                                         QFOR  41
       MINOF(I,J)   =  MINO(I,J)                                         QFOR  42
C                                                                        QFOR  43
       MP2 = M + 2                                                       QFOR  44
       MADZ = MIDZ - 1                                                   QFOR  45
       LATE = NU - 1                                                     QFOR  46
       LAST = MADZ + LATE                                                QFOR  47
       JOLT = 1                                                          QFOR  48
       DO 100  I =1,MADZ                                                 QFOR  49
       CALL GETROW (MI,1,T,N)                                            QFOR  50
       DO 100  J = 1,N                                                   QFOR  51
   100 Z(I,J) = T(J)                                                     QFOR  52
       DO 140  K = 1,N                                                   QFOR  53
       IF (L(K) - M) 140,140,110                                         QFOR  54
   110 DO 130  I = 1,MADZ                                                QFOR  55
       IF (Z(I,K)) 120,130,120                                           QFOR  56
   120 L(K) = I                                                          QFOR  57
       GO TO 110                                                         QFOR  58
```

```
STATEMENT LABELS                  DEF LINE    REFERENCES
  365  4        FMT                 132         112        119
  371  5        FMT                 133          97
    0  40           INACTIVE         69          68
    0  50           INACTIVE         70          69
    0  60           INACTIVE         71          70
    0  70           INACTIVE         72          71
    0  100          INACTIVE         76         2*75
    0  110                           81          80
   73  120                           86         106
    0  130          INACTIVE         92
    0  140          INACTIVE         94         2*93
  147  160                          107          93
  150  920                          108          75
  163  940                          115         2*68       2*69       2*70       2*71
  176  1000                         121         107        114

LOOPS  LABEL    INDEX     FROM-TO     LENGTH     PROPERTIES
   57  110      I          80 81        2B        INSTACK

COMMON BLOCKS   LENGTH     MEMBERS - BIAS NAME(LENGTH)
       FILE          1               0 IPOS    (1)
       COMRWP        3               0 ITAPER  (1)              1 ITAPEW (1)              2 ITAPEP (1)
       CLIST        11               0 KOUNT   (1)              1 KPAGE  (1)              2 LINES  (1)
                                     3 LINEST  (1)              4 KLABEL (1)              5 KTPAGE (1)
                                     6 NPAGE   (1)              7 KBPAGE (1)              8 LINESG (1)
                                     9 KOUNTH  (1)             10 KOUNTI (1)
       CONSTS        2               0 NO      (1)              1 YES    (1)
       CIDIV         1               0 IDIV    (1)

STATISTICS
  PROGRAM LENGTH                 477B      319
  CM LABELED COMMON LENGTH        22B       18
          52000B CM USED
```

```
VARIABLES      SN  TYPE          RELOCATION
                                          DEFINED     74       83       92
      2  LINES     INTEGER            CLIST    REFS     45       94       95      109      110      116      117
     10  LINESG    INTEGER            CLIST    REFS     45
      3  LINEST    INTEGER            CLIST    REFS     45
    423  LOVE      INTEGER                     REFS     86  DEFINED       82
    406  M         INTEGER                     REFS     65       68       69       70       72       83       85
                                                 89     91
    433  MATNAM    INTEGER   ARRAY             REFS     39       65      104
    435  MATNAN    INTEGER   ARRAY             REFS     39       85  DEFINED       62
    437  MATNAP    INTEGER   ARRAY             REFS     39       89      102  DEFINED       63
    407  MC        INTEGER                     REFS     65       69      102      104
    417  MI        INTEGER                     REFS     91      100      101      102  DEFINED       77       99
      0  ML        INTEGER             F.P.    REFS     64       65       91      103      104      105      122
                                          DEFINED     34
    420  MO        INTEGER                     REFS     88       89       91       99  DEFINED       78      100
    411  MR        INTEGER                     REFS     67       70       91  DEFINED       87
      0  MY        INTEGER             F.P.    REFS     66       67       77      123  DEFINED       34
      0  MZ        INTEGER             F.P.    REFS     84       85       91      124  DEFINED       34
      0  M1        INTEGER             F.P.    REFS     76       78      125  DEFINED       34
      0  M2        INTEGER             F.P.    REFS     76      126  DEFINED       34
    412  N         INTEGER                     REFS     67       71       72       73       74       75       82
                                                 85     89       91
    441  NAME1     INTEGER   ARRAY             REFS     40       67
    431  NC        INTEGER                     REFS    102      104
    430  NFILMI    INTEGER                     REFS    102  DEFINED      101
    405  NFILML    INTEGER                     REFS     65      104  DEFINED       64      103
    426  NFILMO    INTEGER                     REFS     89  DEFINED       88
    410  NFILMY    INTEGER                     REFS     67  DEFINED       66
    424  NFILMZ    INTEGER                     REFS     85  DEFINED       84
      0  NO        INTEGER            CONSTS   REFS     47
      6  NPAGE     INTEGER            CLIST    REFS     45
    421  NU        INTEGER                     REFS     91      105  DEFINED       79
      0  T         REAL      ARRAY     F.P.    REFS     41     3*91      105  DEFINED       34       81
      1  YES       INTEGER            CONSTS   REFS     36       47
         VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS          TYPE   ARGS        REFERENCES
         DCLOSE              1            122      123      124      125      126
         GEDLAB              6             65       67      102      104
         MESAGE              3             59      128
         PROGNA              2             58
         PUDLAB              6             85       89
         QFOR               11             91
         QPASS               3            105
         TIMEB               2             60      127
         TITLES              1             96      111      118

INLINE FUNCTIONS   TYPE   ARGS        DEF LINE  REFERENCES
         IABS      INTEGER   1  INTRIN                68
         IABSF     INTEGER   1    SF        52        68
         MAXO      INTEGER   0  INTRIN                72
         MAXOF     INTEGER   2    SF        53        72
         MINO      INTEGER   0  INTRIN                86
         MINOF     INTEGER   2    SF        54        86
```

```
      940 IND=37                                                        QFSOL     116
          LAFT=LINES-KOUNT                                              QFSOL     117
          IF(LAFT.LT.2) KOUNT=LINES                                     QFSOL     118
          CALL TITLES(2)                                                QFSOL     119
          WRITE(ITAPEW,4) IND                                           QFSOL     120
          KOUNT=KOUNT+2                                                 QFSOL     121
     1000 CONTINUE                                                      QFSOL     122
          CALL DCLOSE (ML)                                              QFSOL     123
          CALL DCLOSE (MY)                                              QFSOL     124
          CALL DCLOSE (MZ)                                              QFSOL     125
          CALL DCLOSE (M1)                                              QFSOL     126
          CALL DCLOSE (M2)                                              QFSOL     127
          CALL TIMEB (10,10HFROM QFSOL)                                 QFSOL     128
          CALL MESAGE (2, 5, 5HQFSOL)                                   QFSOL     129
C                                                                       QFSOL     130
C FORMAT STATEMENTS                                                     QFSOL     131
C                                                                       QFSOL     132
        4 FORMAT(/,10X,10(1H*),5HERROR,I4,10(1H*))                      QFSOL     133
        5 FORMAT(/,10X,   36HTOTAL MATRIX EXCEEDS STORAGE IN CORE)      QFSOL     134
C                                                                       QFSOL     135
          RETURN                                                        QFSOL     136
          END                                                           QFSOL     137
```

SYMBOLIC REFERENCE MAP (R=3)

```
ENTRY POINTS     DEF LINE     REFERENCES
   3 QFSOL           34         135

VARIABLES      SN  TYPE             RELOCATION
  351  BLANK       REAL                          REFS        81   DEFINED      61
  422  I           INTEGER                       REFS        81   DEFINED      80
    0  IDIV        INTEGER              CIDIV    REFS        48        73
  432  IND         INTEGER                       REFS       112       119  DEFINED     108     115
  416  IO          INTEGER                       REFS       100   DEFINED      76
    0  IPOS        INTEGER      ARRAY   FILE     REFS        38        43      64      66      84      88     101
                                                          103
    2  ITAPEP      INTEGER              COMRWP   REFS        44
    0  ITAPER      INTEGER              COMRWP   REFS        44
    1  ITAPEW      INTEGER              COMRWP   REFS        44   I/O REFS     97     112     119
    7  KBPAGE      INTEGER              CLIST    REFS        45
    4  KLABEL      INTEGER              CLIST    REFS        45
    0  KORE        INTEGER               F.P.    REFS        41        73      80  DEFINED      34
    0  KOUNT       INTEGER              CLIST    REFS        45        94      98     109     113     116     120
                                               DEFINED       95        98     110     113     117     120
   11  KOUNTH      INTEGER              CLIST    REFS        45
   12  KOUNTI      INTEGER              CLIST    REFS        45
    1  KPAGE       INTEGER              CLIST    REFS        45
  425  KR          INTEGER                       REFS        87        92  DEFINED      86
    5  KTPAGE      INTEGER              CLIST    REFS        45
  427  LAFT        INTEGER                       REFS        95       110     117  DEFINED      94     109     116
  413  LARGE       INTEGER                       REFS        74        91  DEFINED      72
  414  LEAVE       INTEGER                       REFS        74        80      91  DEFINED      73
  415  LEFT        INTEGER                       REFS        75        82      86      92      93
```

```
      CALL PROGNA (4H(QFS,4HOL ))                                       QFSOL     59
      CALL MESAGE (1,32,32HQFSOL - MANAGES FORWARD SOLUTION)            QFSOL     60
      CALL TIMEB (11,11HFROM QFSOL )                                    QFSOL     61
      DATA BLANK /4H    /                                               QFSOL     62
      DATA MATNAN/4HZ-MA,4HTRIX/                                        QFSOL     63
      DATA MATNAP/4HSCRA,4HTCHI/                                        QFSOL     64
      NFILML =  IPOS(ML)                                                QFSOL     65
      CALL GEDLAB (8HQFSOL O1,ML,MATNAM,NFILML,M ,MC)                   QFSOL     66
      NFILMY =  IPOS(MY)                                                QFSOL     67
      CALL GEDLAB (8HQFSOL O2,MY,NAME1 ,NFILMY,MR,N )                   QFSOL     68
      IF (IABSF(M-8192) - 8192) 40, 940, 940                            QFSOL     69
   40 IF (M - MC) 940,50,940                                            QFSOL     70
   50 IF (M - MR) 940,60,940                                            QFSOL     71
   60 IF (N) 940,940,70                                                 QFSOL     72
   70 LARGE  =  MAXOF(M,N) + 2                                          QFSOL     73
      LEAVE = KORE - N/IDIV                                             QFSOL     74
      LEFT = LEAVE - LARGE - N                                          QFSOL     75
      IF (LEFT - N) 920,100,100                                         QFSOL     76
  100 IO = M1 + M2                                                      QFSOL     77
      MI = MY                                                           QFSOL     78
      MO = M1                                                           QFSOL     79
      NU = 1                                                            QFSOL     80
      DO 110  I = LEAVE,KORE                                            QFSOL     81
  110 T(I) = BLANK                                                      QFSOL     82
      LOVE = LEFT / N                                                   QFSOL     83
      LEFT = M                                                          QFSOL     84
      NFILMZ =  IPOS(MZ)                                                QFSOL     85
      CALL PUDLAB (8HQFSOL O1,MZ,MATNAN,NFILMZ,M ,N )                   QFSOL     86
  120 KR     =  MINOF(LEFT,LOVE)                                        QFSOL     87
      MR = KR + 1                                                       QFSOL     88
      NFILMO =  IPOS(MO)                                                QFSOL     89
      CALL PUDLAB (8HQFSOL O2,MO,MATNAP,NFILMO,M ,N )                   QFSOL     90
C     ACTUAL COMPUTATION OF THE FORWARD SOLUTION                        QFSOL     91
      CALL QFOR (T,T(LARGE),T(LEAVE),M,N,NU,MR,ML,MZ,MI,MO)             QFSOL     92
  130 LEFT = LEFT - KR                                                  QFSOL     93
      IF (LEFT) 140,160,140                                             QFSOL     94
  140 LAFT=LINES-KOUNT                                                  QFSOL     95
      IF(LAFT.LT.2) KOUNT=LINES                                         QFSOL     96
      CALL TITLES(2)                                                    QFSOL     97
      WRITE(ITAPEW,5)                                                   QFSOL     98
      KOUNT=KOUNT+2                                                     QFSOL     99
      MI = MO                                                           QFSOL    100
      MO = IO - MI                                                      QFSOL    101
      NFILMI =  IPOS(MI)                                                QFSOL    102
      CALL GEDLAB (8HQFSOL O3,MI,MATNAP,NFILMI,MC,NC)                   QFSOL    103
      NFILML =  IPOS(ML)                                                QFSOL    104
      CALL GEDLAB (8HQFSOL O4,ML,MATNAM,NFILML,MC,NC)                   QFSOL    105
      CALL QPASS (NU,ML,T)                                              QFSOL    106
      GO TO 120                                                         QFSOL    107
  160 GO TO 1000                                                        QFSOL    108
  920 IND=53                                                            QFSOL    109
      LAFT=LINES-KOUNT                                                  QFSOL    110
      IF(LAFT.LT.2) KOUNT=LINES                                         QFSOL    111
      CALL TITLES(2)                                                    QFSOL    112
      WRITE(ITAPEW,4) IND                                               QFSOL    113
      KOUNT=KOUNT+2                                                     QFSOL    114
      GO TO 1000                                                        QFSOL    115
```

```
C45700, SUB. QFSOL (MANAGES ZONING FOR FORWARD SOLUTION OF TRIANG. M.)  QFSOL       2
C                                                                       QFSOL       3
C*********************************************************************** QFSOL       4
C                                                                     * QFSOL       5
C***  SUBROUTINE QFSOL  (ML    ,MY    ,MZ    ,M1    ,M2) ************** QFSOL       6
C                                                                     * QFSOL       7
C***  COMPUTER VERSION  ************************************************ QFSOL       8
C     ----------------                                                * QFSOL       9
C     IBM .... AS IS.                                                 * QFSOL      10
C                                                                     * QFSOL      11
C     CDC .... AS IS.                                                 * QFSOL      12
C                                                                     * QFSOL      13
C***  OBJECTIVE  ******************************************************* QFSOL      14
C     ---------                                                       * QFSOL      15
C     SETS UP AND MANAGES THE ZONING FOR THE FORWARD SOLUTION OF L    * QFSOL      16
C     TRANSPOSE TIMES X = L INVERSE TIMES Y = Z USING L, AND Y, GETTING* QFSOL      17
C     Z.                                                              * QFSOL      18
C                                                                     * QFSOL      19
C***  INPUT/OUTPUT  **************************************************** QFSOL      20
C     ------------                                                    * QFSOL      21
C     THIS SUBROUTINE USES THE LOWER TRIANGLE DECOMPOSITION OF THE    * QFSOL      22
C     STIFFNESS MATRIX, RESIDING ON ML, AND THE APPLIED LOADS ON MY,  * QFSOL      23
C     TO PRODUCE THE Z MATRIX ON MZ.                                  * QFSOL      24
C                                                                     * QFSOL      25
C***  SUMMARY OF SYMBOLS  ********************************************** QFSOL      26
C     ------------------                                              * QFSOL      27
C                                                                     * QFSOL      28
C***  ERROR MESSAGES  ************************************************** QFSOL      29
C     --------------                                                  * QFSOL      30
C     **** ERROR --- ****.                                            * QFSOL      31
C                                                                     * QFSOL      32
C*********************************************************************** QFSOL      33
C                                                                       QFSOL      34
      SUBROUTINE QFSOL (KORE,T,ML,MY,MZ,M1,M2)                          QFSOL      35
C                                                                       QFSOL      36
      INTEGER YES                                                       QFSOL      37
C                                                                       QFSOL      38
      DIMENSION IPOS(1)                                                 QFSOL      39
      DIMENSION MATNAM(2)          ,MATNAN(2)          ,MATNAP(2)       QFSOL      40
      DIMENSION NAME1(2)                                                QFSOL      41
      DIMENSION T(KORE)                                                 QFSOL      42
C                                                                       QFSOL      43
      COMMON /FILE  / IPOS                                              QFSOL      44
      COMMON /COMRWP/ ITAPER,ITAPEW,ITAPEP                              QFSOL      45
      COMMON /CLIST / KOUNT ,KPAGE ,LINES ,LINEST,KLABEL,KTPAGE,NPAGE   QFSOL      46
     1               ,KBPAGE,LINESG,KOUNTH,KOUNTI                       QFSOL      47
      COMMON /CONSTS/ NO    ,YES                                        QFSOL      48
      COMMON /CIDIV / IDIV                                              QFSOL      49
C                                                                       QFSOL      50
C                                                                       QFSOL      51
C FUNCTION DEFINITION                                                   QFSOL      52
      IABSF(I)     =  IABS(I)                                           QFSOL      53
      MAXOF(I,J)   =  MAXO(I,J)                                         QFSOL      54
      MINOF(I,J)   =  MINO(I,J)                                         QFSOL      55
C                                                                       QFSOL      56
C DATA INITIALIZATION                                                   QFSOL      57
C                                                                       QFSOL      58
```

```
STATEMENT LABELS              DEF LINE   REFERENCES
    0  25                       113        112
  163  26                       115        111        160
  166  30                       116        114
  175  35                       121        2*120      151
    0  40         INACTIVE      127        126
  204  42                       130        139
  207  43                       131        148
  213  45                       134        130
  216  50                       136        2*126
  220  55                       140        120
    0  58         INACTIVE      144        143
    0  60         INACTIVE      147        2*146
  226  62                       149        2*143
  233  65                       152        117        133        135        146
  241  70                       155         62        154
  270  80                       169        105        154

LOOPS  LABEL     INDEX     FROM-TO    LENGTH    PROPERTIES
   66  7         KA         79 80        3B      INSTACK
  160  25        J         112 113       2B      INSTACK
  171  65        NROW      117 152      46B

COMMON BLOCKS   LENGTH    MEMBERS - BIAS NAME(LENGTH)
       CLIST        11              0 KOUNT  (1)          1 KPAGE  (1)          2 LINES  (1)
                                    3 LINEST (1)          4 KLABEL (1)          5 KTPAGE (1)
                                    6 NPAGE  (1)          7 KBPAGE (1)          8 LINESG (1)
                                    9 KOUNTH (1)         10 KOUNTI (1)
       FILE         20              0 IPOS   (20)

STATISTICS
  PROGRAM LENGTH                626B      406
  CM LABELED COMMON LENGTH       37B       31
          52000B CM USED
```

```
VARIABLES      SN  TYPE            RELOCATION
   12  KOUNTI      INTEGER              CLIST       REFS        42
    1  KPAGE       INTEGER              CLIST       REFS        42
  536  KROW        INTEGER                          REFS       101      117      164      165  DEFINED       99
    5  KTPAGE      INTEGER              CLIST       REFS        42
  547  L         * INTEGER                          REFS       163
    2  LINES       INTEGER              CLIST       REFS        42
   10  LINESG      INTEGER              CLIST       REFS        42
    3  LINEST      INTEGER              CLIST       REFS        42
  525  LOCEMP      INTEGER                          REFS        89       93  DEFINED       68       93      167
    0  LSIZE       INTEGER               F.P        REFS        36       38       52       60  DEFINED       32
    0  MANS        INTEGER               F.P.       REFS       106      107      170      172      174
                                                 DEFINED        32
    0  MATRIX      INTEGER               F.P.       REFS        53       54       55       56       57       58       75
                                                      77        82       88       91      173  DEFINED       32
  543  MIN         INTEGER                          REFS       115      158      161      162      163
                                                 DEFINED       159
  524  MOUT        INTEGER                          REFS       102      103      155      159  DEFINED       67      161
    0  MTEMP1      INTEGER               F.P.       REFS        66       67      175  DEFINED       32
    0  MTEMP2      INTEGER               F.P.       REFS        66      176  DEFINED       32
  556  NAME        INTEGER     ARRAY                REFS        40       54      103
    0  NAMET       INTEGER     ARRAY     F.P.       REFS        40      107  DEFINED       32
  560  NAME1       INTEGER     ARRAY                REFS        40      163
  541  NCOL        INTEGER                          REFS       110      156      171  DEFINED      109      110
  540  NFMANS      INTEGER                          REFS       107  DEFINED      106
  511  NFMAT       INTEGER                          REFS        54  DEFINED       53
  546  NFMIN       INTEGER                          REFS       163  DEFINED      162
  537  NFMOUT      INTEGER                          REFS       103  DEFINED      102
  514  NIGEO     * INTEGER                          REFS        56
    6  NPAGE       INTEGER              CLIST       REFS        42
  522  NROW        INTEGER                          REFS        97       98       99      123      144
                                                 DEFINED        65       97      117      165
  515  NSGEO       INTEGER                          REFS        57       58

EXTERNALS            TYPE   ARGS        REFERENCES
       DCLOSE                  1             158      173      174      175      176
       DVALUE                  3              60
       GEDLAB                  6              54      163
       GETROW                  4              56       57       58       77       88       91      115
       MESAGE                  3              50      178
       PROGNA                  2              49
       PUDLAB                  6             103      107
       PUTROW                  4             155      170      172
       TIMEB                   2              51      177

STATEMENT LABELS                DEF LINE   REFERENCES
   36  1                           59         55
   54  2                           75         84
    0  4           INACTIVE       102        101
  141  6                          105      2*101
    0  7                           80         79
  150  8                          108        104
   72  10                          81         75       98
  100  11                          85         82
  107  12                          90       2*89      168
  131  20                          99         89     2*98
  151  22                         110        156      171
  154  24                         112         61      111
```

```
                        CALL PUTROW(MANS,0,0,0)                                  TRAN      173
                        CALL DCLOSE (MATRIX)                                     TRAN      174
                        CALL DCLOSE (MANS)                                       TRAN      175
  175                   CALL DCLOSE (MTEMP1)                                     TRAN      176
                        CALL DCLOSE (MTEMP2)                                     TRAN      177
                        CALL TIMEB (9,9HFROM TRAN)                               TRAN      178
                        CALL MESAGE (2. 4, 4HTRAN)                               TRAN      179
                  C                                                              TRAN      180
  180                   RETURN                                                   TRAN      181
                        END                                                      TRAN      182


          SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS      DEF LINE      REFERENCES
    3  TRAN           32          180

VARIABLES      SN  TYPE            RELOCATION
     0  BUFFER      REAL        ARRAY     F.P.        REFS        36       58       60       91      115      123      155
                                                       170   DEFINED       32      113      123      144
   532  DUMMY     * REAL                               REFS        88
     0  IBUFF       INTEGER     ARRAY     F.P.        REFS        38       96      119      125      130      143      145
                                                       146      152  DEFINED       32       94       95      131      132
                                                       134      145      149
   513  ICOL        INTEGER                            REFS        54      103      107      156      171
   533  ICOUNT      INTEGER                            REFS        88       89       91       92
   535  ICT2        INTEGER                            REFS        93       95  DEFINED       92
   526  INDEX       INTEGER                            REFS        90       94     2*95       96      118      119      131
                                                       134      152  DEFINED       69       96      116      152      166
   534  INX         INTEGER                            REFS        91       94      125      132      138    2*149
                                                   DEFINED         90      118
   523  IO          INTEGER                            REFS       161  DEFINED       66
     0  IPOS        INTEGER     ARRAY     FILE        REFS        37       44       53      102      106      162
   544  IPT         INTEGER                            REFS       120      123      124      130      131      132      134
                                                       142      143    2*145      146      147    2*149      150
                                                   DEFINED        119      124      142      147      150
   516  IREAD       INTEGER                            REFS       111  DEFINED       61      160
   512  IROW        INTEGER                            REFS        54       64       68       98      101      103      107
                                                       112      115      155      167      170
   510  .:IZE       INTEGER                            REFS        68      167  DEFINED       52
   521  ISTART      INTEGER                            REFS        69      116      166  DEFINED       64
   517  IWRITE      INTEGER                            REFS       154  DEFINED       62      105
   542  J           INTEGER                            REFS       113      163  DEFINED      112
   545  JPT         INTEGER                            REFS       126      129    2*130  DEFINED      125      129      138
   520  JROW        INTEGER                            REFS       117      158  DEFINED       63      164
     0  JUNITF      INTEGER               F.P.        REFS        55       75       82  DEFINED       32
   531  KA          INTEGER                            REFS        80  DEFINED       79
     7  KBPAGE      INTEGER               CLIST       REFS        42
   550  KFMIG       INTEGER     ARRAY                 REFS        39       77       80
   527  KFMIGC      INTEGER                            REFS        83       84  DEFINED       76       83
   530  KFMIGX      INTEGER                            REFS        80       84  DEFINED       78       80
     4  KLABEL      INTEGER               CLIST       REFS        42
     0  KOUNT       INTEGER               CLIST       REFS        42
    [illegible]  [illegible]      INTEGER               CLIST       REFS        42
```

```
C45700. SUB. REVERS (REVERSE THE ORDER OF A MATRIX ON TAPE)             REVERS      2
C                                                                       REVERS      3
C*********************************************************************** REVERS      4
C                                                                     * REVERS      5
C***  SUBROUTINE REVERS (MAT1  ,MAT2) ********************************* REVERS      6
C                                                                     * REVERS      7
C***  COMPUTER VERSION  ********************************************** REVERS      8
C     ----------------                                                * REVERS      9
C     IBM .... AS IS.                                                 * REVERS     10
C                                                                     * REVERS     11
C     CDC .... AS IS.                                                 * REVERS     12
C                                                                     * REVERS     13
C***  OBJECTIVE  ***************************************************** REVERS     14
C     ---------                                                       * REVERS     15
C     USED TO REVERSE THE ORDER OF A MATRIX ON A TAPE WHEN THE MATRIX * REVERS     16
C     WILL NOT FIT IN CORE.  THE SUBROUTINE READS THE MATRIX INTO THE * REVERS     17
C     ARRAY BUFFER.  WHEN THE ARRAY IS FULL, THE SUBROUTINE KEEPS     * REVERS     18
C     READING THE MATRIX IN, PUTTING THE NEW ROWS INTO BUFFER ON TOP  * REVERS     19
C     OF THE OLD ROWS UNTIL ALL THE MATRIX IS READ IN.  AT THIS TIME  * REVERS     20
C     THE ARRAY WILL CONTAIN THE END OF THE MATRIX WHICH IS THEN      * REVERS     21
C     WRITTEN OUT IN REVERSE ORDER ONTO TAPE MAT2.  THE FIRST MATRIX  * REVERS     22
C     IS THEN AGAIN READ IN UNTIL THE LAST ROW READ ONTO MAT2 IS      * REVERS     23
C     REACHED.  THEN THE PORTION OF THE MATRIX IN BUFFER IS READ OUT  * REVERS     24
C     BACKWARDS ONTO MAT2.  THIS CONTINUES UNTIL ALL THE MATRIX ON MAT1* REVERS     25
C     HAS BEEN REVERSED AND PUT ON MAT2.                              * REVERS     26
C                                                                     * REVERS     27
C***  INPUT/OUTPUT  ************************************************** REVERS     28
C     ------------                                                    * REVERS     29
C     THE SUBROUTINE USES A MATRIX ON TAPE MAT1 AS INPUT, AND PUTS OUT * REVERS     30
C     THE SAME MATRIX IN REVERSE ORDER ON MAT2.                       * REVERS     31
C                                                                     * REVERS     32
C***  SUMMARY OF SYMBOLS  ********************************************* REVERS     33
C     ------------------                                              * REVERS     34
C                                                                     * REVERS     35
C***  ERROR MESSAGES  ************************************************ REVERS     36
C     --------------                                                  * REVERS     37
C     NONE.                                                             REVERS     38
C                                                                     * REVERS     39
C*********************************************************************** REVERS     40
C                                                                       REVERS     41
      SUBROUTINE REVERS (ISIZE,BUFFER,IBUFF,MAT1,MAT2,NAME)             REVERS     42
C                                                                       REVERS     43
      INTEGER YES                                                       REVERS     44
C                                                                       REVERS     45
      DIMENSION IBUFF(ISIZE)      ,IPOS(20)                             REVERS     46
      DIMENSION BUF(300)          ,BUFFER(ISIZE)                        REVERS     47
      DIMENSION MATNAM(2)                                               REVERS     48
      DIMENSION NAME(2)                                                 REVERS     49
C                                                                       REVERS     50
      COMMON /CLUE/IANAL,MAXAN,JCORN,KLU,INVER,KLUT1,MAXAN1,            REVERS     51
     1        NOWARP,NOBEAM,MCROW,JDEFL                                 REVERS     52
      COMMON /COMRWP/ ITAPER,ITAPEW,ITAPEP                              REVERS     53
      COMMON /CLIST / KOUNT ,KPAGE ,LINES ,LINEST,KLABEL,KTPAGE,NPAGE   REVERS     54
     1               ,KBPAGE,LINESG,KOUNTH,KOUNTI                       REVERS     55
      COMMON /CONSTS/ NO    ,YES                                        REVERS     56
      COMMON /FILE  / IPOS                                              REVERS     57
C                                                                       REVERS     58
```

```
C DATA INITIALIZATION                                                  REVERS    59
C                                                                      REVERS    60
      CALL FROGNA (4H(REV,4HERS))                                      REVERS    61
      CALL MESAGE (1,32,32HREVERS - REVERSE ORDER OF MATRIX)           REVERS    62
      CALL TIMEB (11,11HFROM REVERS)                                   REVERS    63
      DATA NAMD/4HDEFL/                                                REVERS    64
    1 NFMAT1 =  IPOS(MAT1)                                             REVERS    65
      CALL GEDLAB (8HREVERSO1,MAT1,MATNAM,NFMAT1,IROW,ICOL)            REVERS    66
      NFMAT2 =  IPOS(MAT2)                                             REVERS    67
      CALL PUDLAB (6HREVERS,MAT2,NAME,NFMAT2,IROW,ICOL)                REVERS    68
      ICOUNT = O                                                       REVERS    69
      LROW=IROW                                                        REVERS    70
COMMENT***THE CODE TO READ IN THE FIRST CORE LOAD IN EACH PASS***      REVERS    71
   20 JROW1=1                                                          REVERS    72
      JPT1=1                                                           REVERS    73
      KROW2=O                                                          REVERS    74
      LOCEMP=ISIZE                                                     REVERS    75
      NROW=O                                                           REVERS    76
      NPT=O                                                            REVERS    77
      INDEX=1                                                          REVERS    78
   22 CALL GETROW (MAT1,-1,DUMMY,ICT)                                  REVERS    79
      IF ((ICT+3).GT.LOCEMP) GO TO 28                                  REVERS    80
      CALL GETROW (MAT1,O,BUFFER(INDEX+2),ICT)                         REVERS    81
      ICT2=ICT+2                                                       REVERS    82
      IBUFF(INDEX+1)=NPT                                               REVERS    83
      NPT=INDEX                                                        REVERS    84
      IBUFF(INDEX)=INDEX+ICT2                                          REVERS    85
      INDEX=IBUFF(INDEX)                                               REVERS    86
      LOCEMP=LOCEMP-ICT2                                               REVERS    87
      NROW=NROW+1                                                      REVERS    88
      IF (NROW-LROW) 22,50,050                                         REVERS    89
   28     CONTINUE                                                     REVERS    90
COMMENT***THE CODE TO GET THE NEEDED LAST ROWS INTO CORE***            REVERS    91
      KROW1=NROW                                                       REVERS    92
      KPT1=NPT                                                         REVERS    93
      LOCEMP=ISIZE                                                     REVERS    94
      INDEX=1                                                          REVERS    95
      JROW2=NROW+1                                                     REVERS    96
      JPT2=1                                                           REVERS    97
      NPT=O                                                            REVERS    98
      ASSIGN 34 TO ISW                                                 REVERS    99
C         READY TO READ IN MORE ROWS OVER THOSE WE ALREADY HAVE        REVERS   100
      GO TO 32                                                         REVERS   101
   30 CALL GETROW (MAT1,-1,DUMMY,ICT)                                  REVERS   102
      IF ((ICT+3).GT.LOCEMP) GO TO 48                                  REVERS   103
   32 JNDEX=INDEX+ICT+3                                                REVERS   104
      GO TO ISW,(34,40)                                                REVERS   105
C       KEEP TRACK OF HOW MANY ROWS FROM PREVIOUS PASS WE WILL CLOBBER REVERS   106
C       UNLESS WE HAVE ALREADY CLOBBERED THEM ALL                      REVERS   107
   34 JROW1=JROW1+1                                                    REVERS   108
      IF (JROW1.GT.KROW1) GO TO 45                                     REVERS   109
      JPT1=IBUFF(JPT1)                                                 REVERS   110
      IF (JPT1-JNDEX) 34,40,40                                         REVERS   111
   40 CALL GETROW (MAT1,O,BUFFER(INDEX+2),ICT)                         REVERS   112
      IBUFF(INDEX+1)=NPT                                               REVERS   113
      NPT=INDEX                                                        REVERS   114
      INDEX=INDEX+ICT+2                                                REVERS   115
```

```
            IBUFF(INDEX)=JNDEX                                          REVERS     116
            INDEX=JNDEX                                                 REVERS     117
            LOCEMP=LOCEMP-ICT-2                                         REVERS     118
            NROW=NROW+1                                                 REVERS     119
            IF (NROW-LROW) 30,52,052                                    REVERS     120
         45 ASSIGN 40 TO ISW                                            REVERS     121
            KROW1=0                                                     REVERS     122
      C         SIGNAL COMPLETE DESTRUCTION OF PREVIOUS PASS            REVERS     123
            GO TO 40                                                    REVERS     124
         48 JROW1=JROW2                                                 REVERS     125
            JPT1=JPT2                                                   REVERS     126
      C         REINITIALIZE FOR ANOTHER PASS                           REVERS     127
            GO TO 28                                                    REVERS     128
         50 KROW1=LROW                                                  REVERS     129
            KPT1=NPT                                                    REVERS     130
            GO TO 55                                                    REVERS     131
         52 KROW2=LROW                                                  REVERS     132
            KPT2=NPT                                                    REVERS     133
         55     CONTINUE                                                REVERS     134
      C         LAST UNWRITTEN ROWS OF MATRIX ARE IN CORE               REVERS     135
      C         KROW1=0 MEANS  FIRST PART IS NULL                       REVERS     136
      C         KROW2=0 MEANS SECOND PART IS NULL                       REVERS     137
            IF (KROW2.EQ.0) GO TO 72                                    REVERS     138
            KPT=KPT2                                                    REVERS     139
            NROW=KROW2                                                  REVERS     140
            JROW=JROW2                                                  REVERS     141
         62 NPT=KPT                                                     REVERS     142
         64 IF (NROW-JROW) 70,66,66                                     REVERS     143
         66 ICT=IBUFF(NPT)-NPT-2                                        REVERS     144
            CALL PUTROW (MAT2,0,BUFFER(NPT+2),ICT)                      REVERS     145
            ICOUNT = ICOUNT+1                                           REVERS     146
            IF (MATNAM(1).NE.NAMD) GO TO 91                             REVERS     147
            IF (JDEFL.EQ.0) GO TO 91                                    REVERS     148
            CALL UNPACK (BUFFER(NPT+2),ICT,BUF,ICOL,LD)                 REVERS     149
            LAFT=LINES-KOUNT                                            REVERS     150
            IF(LAFT.LT.3) KOUNT=LINES                                   REVERS     151
            CALL TITLES(2)                                              REVERS     152
            WRITE(ITAPEW,95) ICOUNT                                     REVERS     153
            KOUNT=KOUNT+3                                               REVERS     154
      C                                                                 REVERS     155
            LAST=0                                                      REVERS     156
        100 CONTINUE                                                    REVERS     157
            NEXT=LAST+1                                                 REVERS     158
            LAST=LAST+8                                                 REVERS     159
            IF(LAST.GT.ICOL) LAST=ICOL                                  REVERS     160
            CALL TITLES(2)                                              REVERS     161
            WRITE(ITAPEW,96) (BUF(II),II=NEXT.LAST)                     REVERS     162
            KOUNT=KOUNT+1                                               REVERS     163
            IF(LAST.LT.ICOL) GO TO 100                                  REVERS     164
         91 NROW=NROW-1                                                 REVERS     165
            NPT=IBUFF(NPT+1)                                            REVERS     166
      C         FETCH POINTER TO PREVIOUS ROW                           REVERS     167
            GO TO 64                                                    REVERS     168
         70 LROW=JROW-1                                                 REVERS     169
      C         REGISTER ROWS WHICH HAVE JUST BEEN PUT OUT              REVERS     170
            IF (JROW.EQ.JROW1) GO TO 75                                 REVERS     171
      C         OTHERWISE WE JUST WROTE OUT SECOND PART,NOW TRY FIRST   REVERS     172
```

```
          72 IF (KROW1.EQ.O) GO TO 75                                   REVERS    173
             KPT=KPT1                                                   REVERS    174
             NROW=KROW1                                                 REVERS    175
             JROW=JROW1                                                 REVERS    176
             GO TO 62                                                   REVERS    177
          75 IF (LROW.GT.O) GO TO 80                                    REVERS    178
             GO TO 1000                                                 REVERS    179
          80 NFMAT1 =  IPOS(MAT1)                                       REVERS    180
             CALL GEDLAB (8HREVERSO2,MAT1,MATNAM,NFMAT1,IROW,ICOL)      REVERS    181
        C        REPOSITION FOR ANOTHER PASS                            REVERS    182
             GO TO 2                                                    REVERS    183
        1000 CONTINUE                                                   REVERS    184
             CALL DCLOSE (MAT1)                                         REVERS    185
             CALL DCLOSE (MAT2)                                         REVERS    186
             CALL TIMEB (11,11HFROM REVERS)                             REVERS    187
             CALL MESAGE (2, 6, 6HREVERS)                               REVERS    188
        C                                                               REVERS    189
        C FORMAT STATEMENTS                                             REVERS    190
        C                                                               REVERS    191
          95 FORMAT(/,10X,    8HICOUNT= ,I5,/)                          REVERS    192
          96 FORMAT(10X,1P8E15.6)                                       REVERS    193
        C                                                               REVERS    194
             RETURN                                                     REVERS    195
             END                                                        REVERS    196
```

```
     SYMBOLIC REFERENCE MAP (R=3)

 ENTRY POINTS     DEF LINE     REFERENCES
     3  REVERS       41          194

 VARIABLES      SN  TYPE          RELOCATION
   472  BUF         REAL       ARRAY             REFS      46      148      161
     0  BUFFER      REAL       ARRAY    F.P.     REFS      46       80      111      144      148
                                              DEFINED      41
   451  DUMMY       REAL                         REFS      78      101
     0  IANAL       INTEGER             CLUE     REFS      50
     0  IBUFF       INTEGER    ARRAY    F.P.     REFS      45       85      109      143      165
                                              DEFINED      41       82       84      112      115
   436  ICOL        INTEGER                      REFS      65       67      148    2*159      163      180
   440  ICOUNT      INTEGER                      REFS     145      152  DEFINED       68      145
   452  ICT         INTEGER                      REFS      78       79       80       81      101      102      103
                                                  111     114      117      144      148  DEFINED      143
   453  ICT2        INTEGER                      REFS      84       86  DEFINED       81
   471  II          INTEGER                      REFS     161  DEFINED      161
   450  INDEX       INTEGER                      REFS      80       82       83     2*84       85      103      111
                                                  112     113      114      115  DEFINED       77       85       94
                                                  116
     4  INVER       INTEGER             CLUE     REFS      50
     0  IPOS        INTEGER    ARRAY    FILE     REFS      45       56       64       66      179
   435  IROW        INTEGER                      REFS      65       67       69      180
     0  ISIZE       INTEGER             F.P.     REFS      45       46       74       93  DEFINED       41
   460  ISW         INTEGER                      REFS     104  DEFINED       98      120
     2  ITAPEP      INTEGER             COMRWP   REFS      52
```

```
VARIABLES     SN  TYPE          RELOCATION
    0  ITAPER     INTEGER           COMRWP      REFS        52
    1  ITAPEW     INTEGER           COMRWP      REFS        52     I/O REFS     152       161
    2  JCORN      INTEGER           CLUE        REFS        50
   12  JDEFL      INTEGER           CLUE        REFS        50          147
  461  JNDEX      INTEGER                       REFS       110          115       116   DEFINED       103       114
  443  JPT1       INTEGER                       REFS       109          110   DEFINED        72       109       125
  457  JPT2       INTEGER                       REFS       125      DEFINED        96
  464  JROW       INTEGER                       REFS       142          168       170   DEFINED       140       175
  442  JROW1      INTEGER                       REFS       107          108       170       175   DEFINED        71       107
                                                 124
  456  JROW2      INTEGER                       REFS       124          140   DEFINED        95
    7  KBPAGE     INTEGER           CLIST       REFS        53
    4  KLABEL     INTEGER           CLIST       REFS        53
    3  KLU        INTEGER           CLUE        REFS        50
    5  KLUT1      INTEGER           CLUE        REFS        50
    0  KOUNT      INTEGER           CLIST       REFS        53          149       153       162   DEFINED       150       153
                                                 162
   11  KOUNTH     INTEGER           CLIST       REFS        53
   12  KOUNTI     INTEGER           CLIST       REFS        53
    1  KPAGE      INTEGER           CLIST       REFS        53
  463  KPT        INTEGER                       REFS       141      DEFINED       138       173
  455  KPT1       INTEGER                       REFS       173      DEFINED        92       129
  462  KPT2       INTEGER                       REFS       138      DEFINED       132
  454  KROW1      INTEGER                       REFS       108          172       174   DEFINED        91       121       128
  444  KROW2      INTEGER                       REFS       137          139   DEFINED        73       131
    5  KTPAGE     INTEGER           CLIST       REFS        53
  466  LAFT       INTEGER                       REFS       150      DEFINED       149
  467  LAST       INTEGER                       REFS       157          158       159       161       163
                                             DEFINED       155          158       159
  465  LD      *  INTEGER                       REFS       148
    2  LINES      INTEGER           CLIST       REFS        53          149       150
   10  LINESG     INTEGER           CLIST       REFS        53
    3  LINEST     INTEGER           CLIST       REFS        53
  445  LOCEMP     INTEGER                       REFS        79           86       102       117   DEFINED        74        86
                                                  93       117
  441  LROW       INTEGER                       REFS        88          119       128       131       177
                                             DEFINED        69          168
 1146  MATNAM     INTEGER    ARRAY              REFS        47           65       146       180
    0  MAT1       INTEGER             F.P.      REFS        64           65        78        80       101       111       179
                                                 180       184      DEFINED        41
    0  MAT2       INTEGER             F.P.      REFS        66           67       144       185   DEFINED        41
    1  MAXAN      INTEGER           CLUE        REFS        50
    6  MAXAN1     INTEGER           CLUE        REFS        50
   11  MCROW      INTEGER           CLUE        REFS        50
  407  NAMD       INTEGER                       REFS       146      DEFINED        63
    0  NAME       INTEGER    ARRAY    F.P.      REFS        48           67   DEFINED        41
  470  NEXT       INTEGER                       REFS       161      DEFINED       157
  434  NFMAT1     INTEGER                       REFS        65          180   DEFINED        64       179
  437  NFMAT2     INTEGER                       REFS        67      DEFINED        66
    0  NO         INTEGER           CONSTS      REFS        55
   10  NOBEAM     INTEGER           CLUE        REFS        50
    7  NOWARP     INTEGER           CLUE        REFS        50
    6  NPAGE      INTEGER           CLIST       REFS        53
  447  NPT        INTEGER                       REFS        82           92       112       129       132     2*143       144
                                                 148       165      DEFINED        76        83        97       113       141
                                                 165
  446  NROW       INTEGER                       REFS        87           88        91        95       118       119       142
```

```
VARIABLES      SN  TYPE            RELOCATION
                                                  164    DEFINED      75       87      118      139      164      174
     1  YES        INTEGER             CONSTS     REFS       43       55
        VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS            TYPE   ARGS         REFERENCES
        DCLOSE                 1            184   185
        GEDLAB                 6             65   180
        GETROW                 4             78    80      101      111
        MESAGE                 3             61   187
        PROGNA                 2             60
        PUDLAB                 6             67
        PUTROW                 4            144
        TIMEB                  2             62   186
        TITLES                 1            151   160
        UNPACK                 5            148

STATEMENT LABELS            DEF LINE   REFERENCES
     0  1          INACTIVE     64
    30  20                      71      182
    36  22                      78       88
    66  28                      89       79   127
    77  30                     101      119
   106  32                     103      100
   112  34                     107       98   104      110
   121  40                     111      104  2*110     120      123
   141  45                     120      108
   144  48                     124      102
   147  50                     128     2*88
   152  52                     131    2*119
   155  55                     133      130
   162  62                     141      176
   164  64                     142      167
     0  66         INACTIVE    143    2*142
   251  70                     168      142
   255  72                     172      137
   262  75                     177      170   172
   264  80                     179      177
   245  91                     164      146   147
   420  95      FMT            191      152
   423  96      FMT            192      161
   223  100                    156      163
   272  1000                   183      178

COMMON BLOCKS   LENGTH    MEMBERS - BIAS NAME(LENGTH)
        CLUE        11              0 IANAL   (1)         1 MAXAN   (1)         2 JCORN   (1)
                                    3 KLU     (1)         4 INVER   (1)         5 KLUT1   (1)
                                    6 MAXAN1  (1)         7 NOWARP  (1)         8 NOBEAM  (1)
                                    9 MCROW   (1)        10 JDEFL   (1)
        COMRWP       3              0 ITAPER  (1)         1 ITAPEW  (1)         2 ITAPEP  (1)
        CLIST       11              0 KOUNT   (1)         1 KPAGE   (1)         2 LINES   (1)
                                    3 LINEST  (1)         4 KLABEL  (1)         5 KTPAGE  (1)
                                    6 NPAGE   (1)         7 KBPAGE  (1)         8 LINESG  (1)
                                    9 KOUNTH  (1)        10 KOUNTI  (1)
        CONSTS       2              0 NO      (1)         1 YES     (1)
        FILE        20              0 IPOS    (20)
```

```
STATISTICS
  PROGRAM LENGTH                 1177B      639
  CM LABELED COMMON LENGTH         57B       47
          52000B CM USED
```

```
C45700, SUB. QBSOL (SOLVE THE EQUATION FOR THE NODAL DEFLECTIONS)          QBSOL     2
C                                                                          QBSOL     3
C************************************************************************ QBSOL     4
C                                                                        * QBSOL     5
C***   SUBROUTINE QBSOL  (MB    ,MZ    ,MX    ,M1    ,M2) *************** QBSOL     6
C                                                                        * QBSOL     7
C***   OBJECTIVE  *************************************************** QBSOL     8
C      ---------                                                         * QBSOL     9
C      SOLVES THE EQUATION L TRANSPOSE TIMES X = Z TO OBTAIN X WHICH IS * QBSOL    10
C      THE MATRIX OF NODAL DEFLECTIONS.  IN GENERAL OBSOL ONLY MANAGES  * QBSOL    11
C      THE SOLUTION; THE ACTUAL COMPUTATIONS ARE DONE IN QBAC. IF JDEFL * QBSOL    12
C      IS NON ZERO, THE DEFLECTIONS ARE PRINTED OUT.                    * QBSOL    13
C                                                                        * QBSOL    14
C***   INPUT/OUTPUT  ************************************************* QBSOL    15
C      ------------                                                      * QBSOL    16
C      THIS SUBROUTINE USES THE Z MATRIX ON MZ AND THE LOWER TRIANGLE   * QBSOL    17
C      MATRIX ON MB TO PRODUCE THE DEFLECTIONS ON MX.                   * QBSOL    18
C                                                                        * QBSOL    19
C***   SUMMARY OF SYMBOLS  ******************************************* QBSOL    20
C      ------------------                                                * QBSOL    21
C                                                                        * QBSOL    22
C***   ERROR MESSAGES  *********************************************** QBSOL    23
C      --------------                                                    * QBSOL    24
C      **** ERROR --- ****.                                             * QBSOL    25
C                                                                        * QBSOL    26
C************************************************************************ QBSOL    27
C                                                                          QBSOL    28
      SUBROUTINE QBSOL (KORE,T,NAME1,MB,MZ,MX,M1,M2)                       QBSOL    29
C                                                                          QBSOL    30
      INTEGER YES                                                          QBSOL    31
C                                                                          QBSOL    32
      DIMENSION MATNAM(2)                                                  QBSOL    33
      DIMENSION NAME1(2)                                                   QBSOL    34
      DIMENSION IPOS(20)                                                   QBSOL    35
      DIMENSION T(KORE)                                                    QBSOL    36
C                                                                          QBSOL    37
      COMMON /CLUE/IANAL,MAXAN,JCORN,KLU,INVER,KLUT1,MAXAN1,               QBSOL    38
     1        NOWARP,NOBEAM,MCROW,JDEFL                                    QBSOL    39
      COMMON /COMRWP/ ITAPER,ITAPEW,ITAPEP                                 QBSOL    40
      COMMON /CLIST / KOUNT ,KPAGE ,LINES ,LINEST,KLABEL,KTPAGE,NPAGE      QBSOL    41
     1                ,KBPAGE,LINESG,KOUNTH,KOUNTI                         QBSOL    42
      COMMON /CONSTS/ NO    ,YES                                           QBSOL    43
      COMMON /FILE  / IPOS                                                 QBSOL    44
      COMMON /CIDIV / IDIV                                                 QBSOL    45
C                                                                          QBSOL    46
C                                                                          QBSOL    47
C                                                                          QBSOL    48
C FUNCTION DEFINITION                                                      QBSOL    49
      IABSF(I)     =  IABS(I)                                              QBSOL    50
      MAXOF(I,J)   =  MAXO(I,J)                                            QBSOL    51
C                                                                          QBSOL    52
C DATA INITIALIZATION                                                      QBSOL    53
C                                                                          QBSOL    54
      CALL PROGNA (4H(QBS,4HOL ))                                          QBSOL    55
      CALL MESAGE (1,33,33HQBSOL - MANAGES BACKWARD SOLUTION)              QBSOL    56
      CALL TIMEB (11,11HFROM QBSOL )                                       QBSOL    57
      DATA NAME/4HDEFL/                                                    QBSOL    58
```

```
   30 NIX = 0
      IF(NAME1(1).NE.NAME) GO TO 31
      IF (JDEFL.EQ.0) GO TO 31
      KOUNT=LINES
      CALL TITLES(2)
      KOUNT=KOUNT+2
      WRITE(ITAPEW,6)
   31 NFILMB =  IPOS(MB)
      CALL GEDLAB (8HQBSOL 01,MB,MATNAM,NFILMB,M ,MC)
      NFILMZ =  IPOS(MZ)
      CALL GEDLAB (8HQBSOL 02,MZ,MATNAM,NFILMZ,MR,N )
      IF (IABSF(M-8192) - 8192) 40, 940, 940
   40 IF (M - MC) 940,50,940
   50 IF (M - MR) 940,60,940
   60 IF (N) 940,940,70
   70 LL = KORE - M/IDIV
      LA     =  MAXOF(M,N) + 2
      LEFT = LL - LA
      IF (LEFT - LA) 920,920,100
  100 IO = M1 + M2
      MI = MZ
      MO = M1
      MU = M
      NFILMX = IPOS(MX)
      CALL PUDLAB (8HQBSOL 01,MX,NAME1 ,NFILMX, M,N )
  110 NFILMO =  IPOS(MO)
      CALL PUDLAB (8HQBSOL 02,MO,MATNAM,NFILMO, M,N )
C     ACTUAL COMPUTATION OF THE BACKWARD SOLUTION
      CALL QBAC (T,T(LA),T(LA),T(LL),M,N,MU,LEFT,MB,MX,MI,MO)
  120 IF (MU) 130,150,130
  130 CONTINUE
      CALL TITLES(2)
      WRITE(ITAPEW,5)
      KOUNT=KOUNT+1
      MI = MO
      MO = IO - MI
      NFILMI =  IPOS(MI)
      CALL GEDLAB (8HQBSOL 03,MI,MATNAM,NFILMI,MC,NC)
      GO TO 110
  150 GO TO 1000
  920 IND=54
      CALL TITLES(2)
      KCUNT=KOUNT+1
      WRITE(ITAPEW,4) IND
      GO TO 1000
  940 IND=38
      CALL TITLES(2)
      KOUNT=KOUNT+1
      WRITE(ITAPEW,4) IND
 1000 CONTINUE
      CALL DCLOSE (MB)
      CALL DCLOSE (MZ)
      CALL DCLOSE (MX)
      CALL DCLOSE (M1)
      CALL DCLOSE (M2)
      CALL TIMEB (10,10HFROM QBSOL)
```

```
  115         C                                                                        QBSOL      116
              C FORMAT STATEMENTS                                                      QBSOL      117
              C                                                                        QBSOL      118
                  4 FORMAT(10X,10(1H*),6HERROR ,I4,10(1H*))                            QBSOL      119
                  5 FORMAT(10X,36HTOTAL MATRIX EXCEEDS STORAGE IN CORE)                QBSOL      120
  120             6 FORMAT(40X,52HN  O  D  A  L       D  E  F  L  E  C  T  I  O  N  S QBSOL      121
                   1          ,/)                                                      QBSOL      122
              C                                                                        QBSOL      123
                    RETURN                                                             QBSOL      124
                    END                                                                QBSOL      125


    SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS      DEF LINE     REFERENCES
    3  QBSOL          28         123

VARIABLES      SN  TYPE            RELOCATION
    0  IANAL        INTEGER            CLUE          REFS        37
    0  IDIV         INTEGER            CIDIV         REFS        44       73
  376  IND          INTEGER                          REFS       101      106     DEFINED      98       103
    4  INVER        INTEGER            CLUE          REFS        37
  366  IO           INTEGER                          REFS        93   DEFINED       77
    0  IPOS         INTEGER    ARRAY   FILE          REFS        34       43        65        67        81        83        94
    2  ITAPEP       INTEGER            COMRWP        REFS        39
    0  ITAPER       INTEGER            COMRWP        REFS        39
    1  ITAPEW       INTEGER            COMRWP        REFS        39   I/O REFS      64        90       101       106
    2  JCORN        INTEGER            CLUE          REFS        37
   12  JDEFL        INTEGER            CLUE          REFS        37       60
    7  KBPAGE       INTEGER            CLIST         REFS        40
    4  KLABEL       INTEGER            CLIST         REFS        40
    3  KLU          INTEGER            CLUE          REFS        37
    5  KLUT1        INTEGER            CLUE          REFS        37
    0  KORE         INTEGER             F.P.         REFS        35       73     DEFINED      28
    0  KOUNT        INTEGER            CLIST         REFS        40       63        91       100       105
                                                  DEFINED        61       63        91       100       105
   11  KOUNTH       INTEGER            CLIST         REFS        40
   12  KOUNTI       INTEGER            CLIST         REFS        40
    1  KPAGE        INTEGER            CLIST         REFS        40
    5  KTPAGE       INTEGER            CLIST         REFS        40
  364  LA           INTEGER                          REFS        75       76      2*86   DEFINED        74
  365  LEFT         INTEGER                          REFS        76       86     DEFINED      75
    2  LINES        INTEGER            CLIST         REFS        40       61
   10  LINESG       INTEGER            CLIST         REFS        40
    3  LINEST       INTEGER            CLIST         REFS        40
  363  LL           INTEGER                          REFS        75       86     DEFINED      73
  356  M            INTEGER                          REFS        66       69        70        71        73        74        80
                                                       82        84       86
  377  MATNAM       INTEGER    ARRAY                 REFS        32       66        68        84        95
    1  MAXAN        INTEGER            CLUE          REFS        37
    6  MAXAN1       INTEGER            CLUE          REFS        37
    0  MB           INTEGER             F.P.         REFS        65       66        86       108   DEFINED        28
  357  MC           INTEGER                          REFS        66       70        95
   11  MCROW        INTEGER            CLUE          REFS        37
```

```
VARIABLES      SN  TYPE            RELOCATION
  367  MI          INTEGER                       REFS      86      93      94      95   DEFINED     78      92
  370  MO          INTEGER                       REFS      83      84      86      92   DEFINED     79      93
  361  MR          INTEGER                       REFS      68      71
  371  MU          INTEGER                       REFS      86      87 DEFINED      80
    0  MX          INTEGER           F.P.        REFS      81      82      86     110   DEFINED     28
    0  MZ          INTEGER           F.P.        REFS      67      68      78     109   DEFINED     28
    0  M1          INTEGER           F.P.        REFS      77      79     111 DEFINED      28
    0  M2          INTEGER           F.P.        REFS      77     112 DEFINED      28
  362  N           INTEGER                       REFS      68      72      74      82      84      86
  305  NAME        INTEGER                       REFS      59 DEFINED      57
    0  NAME1       INTEGER   ARRAY   F.P.        REFS      33      59      82 DEFINED      28
  375  NC        * INTEGER                       REFS      95
  355  NFILMB      INTEGER                       REFS      66 DEFINED      65
  374  NFILMI      INTEGER                       REFS      95 DEFINED      94
  373  NFILMO      INTEGER                       REFS      84 DEFINED      83
  372  NFILMX      INTEGER                       REFS      82 DEFINED      81
  360  NFILMZ      INTEGER                       REFS      68 DEFINED      67
  354  NIX       * INTEGER                    DEFINED      58
    0  NO          INTEGER           CONSTS      REFS      42
   10  NOBEAM      INTEGER           CLUE        REFS      37
    7  NOWARP      INTEGER           CLUE        REFS      37
    6  NPAGE       INTEGER           CLIST       REFS      40
    0  T           REAL      ARRAY   F.P.        REFS      35    4*86 DEFINED      28
    1  YES         INTEGER           CONSTS      REFS      30      42
       VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS          TYPE   ARGS       REFERENCES
       DCLOSF               1          108     109     110     111     112
       GEDLAB               6           66      68      95
       MESAGE               3           55     114
       PROGNA               2           54
       PUDLAB               6           82      84
       QBAC                12           86
       TIMEB                2           56     113
       TITLES               1           62      89      99     104

INLINE FUNCTIONS   TYPE   ARGS         DEF LINE   REFERENCES
       IABS        INTEGER  1  INTRIN                 69
       IABSF       INTEGER  1   SF           49       69
       MAXO        INTEGER  0  INTRIN                 74
       MAXOF       INTEGER  2   SF           50       74

STATEMENT LABELS             DEF LINE   REFERENCES
  324  4       FMT              118        101     106
  330  5       FMT              119         90
  336  6       FMT              120         64
    0  30          INACTIVE      58
   25  31                        65         59      60
    0  40          INACTIVE      70         69
    0  50          INACTIVE      71         70
    0  60          INACTIVE      72         71
    0  70          INACTIVE      73         72
    0  100         INACTIVE      77         76
   73  110                       83         96
    0  120         INACTIVE      87
    0  130         INACTIVE      88       2*87
  126  150                       97         87
```

```
STATEMENT LABELS              DEF LINE   REFERENCES
  127  920                       98        2*76
  136  940                      103        2*69       2*70       2*71       2*72
  144  1000                     107         97        102

COMMON BLOCKS   LENGTH       MEMBERS - BIAS NAME(LENGTH)
       CLUE         11                 0 IANAL   (1)           1 MAXAN  (1)           2 JCORN  (1)
                                       3 KLU     (1)           4 INVER  (1)           5 KLUT1  (1)
                                       6 MAXAN1  (1)           7 NOWARP (1)           8 NOBEAM (1)
                                       9 MCROW   (1)          10 JDEFL  (1)
       COMRWP        3                 0 ITAPER  (1)           1 ITAPEW (1)           2 ITAPEP (1)
       CLIST        11                 0 KOUNT   (1)           1 KPAGE  (1)           2 LINES  (1)
                                       3 LINEST  (1)           4 KLABEL (1)           5 KTPAGE (1)
                                       6 NPAGE   (1)           7 KBPAGE (1)           8 LINESG (1)
                                       9 KOUNTH  (1)          10 KOUNTI (1)
       CONSTS        2                 0 NO      (1)           1 YES    (1)
       FILE         20                 0 IPOS    (20)
       CIDIV         1                 0 IDIV    (1)

STATISTICS
  PROGRAM LENGTH                  433B     283
  CM LABELED COMMON LENGTH        60B       48
          52000B CM USED
```

```
      C45700, SUB. QBAC  (COMPUTE THE BACKWARD SOL. OF EQ. FOR NODAL DEFL'S)   QBAC   2
      C                                                                         QBAC   3
      C*********************************************************************** QBAC   4
      C                                                                       * QBAC   5
      C                                                                       * QBAC   6
      C***   SUBROUTINE QBAC   (T     ,B     ,X     ,L     ,M     ,N          * QBAC   7
      C                         ,MU    ,KORE  ,MB    ,MX    ,MI    ,MO)       * QBAC   8
      C***   OBJECTIVE  *************************************************** QBAC   9
      C      ---------                                                        * QBAC  10
      C      CALLED BY QBSOL TO COMPUTE THE BACKWARD SOLUTION OF THE EQUATION * QBAC  11
      C      L TRANSPOSE TIMES X = Z, THUS OBTAINING THE MATRIX OF NODAL      * QBAC  12
      C      DEFLECTIONS X.                                                   * QBAC  13
      C                                                                       * QBAC  14
      C***   INPUT/OUTPUT  ************************************************ QBAC  15
      C      ------------                                                     * QBAC  16
      C      THIS SUBROUTINE USES THE INTERMEDIATE Z MATRIX IN REVERSE ORDER, * QBAC  17
      C      RESIDING ON MZ, AND THE LOWER TRIANGULAR MATRIX IN REVERSE ORDER * QBAC  18
      C      ON MB, TO PRODUCE THE DEFLECTIONS ON MX, ALSO IN REVERSE ORDER.  * QBAC  19
      C                                                                       * QBAC  20
      C***   SUMMARY OF SYMBOLS  ****************************************** QBAC  21
      C      ------------------                                               * QBAC  22
      C                                                                       * QBAC  23
      C***   ERROR MESSAGES  ********************************************** QBAC  24
      C      --------------                                                   * QBAC  25
      C      NONE.                                                              QBAC  26
      C                                                                       * QBAC  27
      C*********************************************************************** QBAC  28
      C                                                                         QBAC  29
            SUBROUTINE QBAC (T,B,X,L,M,N,MU,KORE,MB,MX,MI,MO)                  QBAC  30
      C                                                                         QBAC  31
      C                                                                         QBAC  32
      CIBM  BEGINNING OF TYPE STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS QBAC  33
      C     DOUBLE PRECISION S                                                  QBAC  34
      CIBM  ENDING OF TYPE STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS    QBAC  35
      C                                                                         QBAC  36
            DIMENSION B(1),X(N,1),T(1),L(1)                                     QBAC  37
      C                                                                         QBAC  38
            IT = MX                                                             QBAC  39
            LOW = MU + 1                                                        QBAC  40
            MP2 = M + 2                                                         QBAC  41
            KEY = 0                                                             QBAC  42
            MUI = 0                                                             QBAC  43
            LX = 0                                                              QBAC  44
            LB = KORE                                                           QBAC  45
         90 I = MU - MUI                                                        QBAC  46
            IF (I) 100,250,100                                                  QBAC  47
        100 IF (KEY) 150,110,150                                                QBAC  48
        110 LLB = LB + 1 - I                                                    QBAC  49
            LX = LX + N                                                         QBAC  50
            IF (LX - LLB) 130,120,120                                           QBAC  51
        120 KEY = 1                                                             QBAC  52
            IT = MO                                                             QBAC  53
            GO TO 150                                                           QBAC  54
        130 CALL GETROW (MB,-1,DUMMY,KOUNT)                                     QBAC  55
            LOC = MP2 - KOUNT                                                   QBAC  56
            CALL GETROW (MB,0,T(LOC),KOUNT)                                     QBAC  57
```

```
                 L(I) = I - LEAD                                          QBAC       59
                 LLB = LB + 1 - L(I)                                      QBAC       60
                 J = LEAD                                                 QBAC       61
                 DO 140  JI = LLB,LB                                      QBAC       62
                 J = J + 1                                                QBAC       63
             140 B(JI) = T(J)                                             QBAC       64
             150 CALL GETROW (MI,1,T,N)                                   QBAC       65
                 K = MU                                                   QBAC       66
                 INC = L(MU)                                              QBAC       67
                 KK = KORE - L(MU)                                        QBAC       68
                 KI = KORE - MUI                                          QBAC       69
                 MUI = MUI + 1                                            QBAC       70
           C     ENTRY POINT IN HOTDOT                                    QBAC       71
                 CALL HOTDOT (N,O,T,X,S,1,N,2)                            QBAC       72
             160 IF (K - LOW) 210,170,170                                 QBAC       73
             170 IF (KI - KK) 180,180,190                                 QBAC       74
             180 S = O.                                                   QBAC       75
                 GO TO 200                                                QBAC       76
             190 S = -B(KI)                                               QBAC       77
             200 CALL HOTDOT (N,O,T,X,S,1,N,3)                            QBAC       78
                 KI = KI - INC + 1                                        QBAC       79
                 K = K - 1                                                QBAC       80
                 INC = L(K)                                               QBAC       81
                 KK = KK - INC                                            QBAC       82
                 GO TO 160                                                QBAC       83
             210 IF (KEY) 240,220,240                                     QBAC       84
             220 R = B(LB)                                                QBAC       85
                 LOW = I                                                  QBAC       86
                 DO 230  J = 1,N                                          QBAC       87
                 T(J) = T(J) / R                                          QBAC       88
             230 X(J,MUI) = T(J)                                          QBAC       89
             240 CALL PUTROW (IT,1,T,N)                                   QBAC       90
                 LB = LLB - 1                                             QBAC       91
                 GO TO 90                                                 QBAC       92
             250 MU = LOW - 1                                             QBAC       93
                 RETURN                                                   QBAC       94
                 END                                                      QBAC       95
```

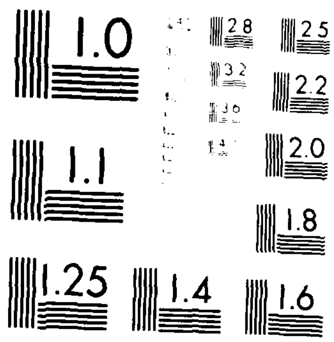
SYMBOLIC REFERENCE MAP (R=3)

```
ENTRY POINTS      DEF LINE      REFERENCES
   3  QBAC            29          93

VARIABLES      SN  TYPE           RELOCATION
   O  B            REAL       ARRAY     F.P.     REFS       36       76       84   DEFINED       29       63
 272  DUMMY     *  REAL                          REFS       54
 270  I            INTEGER                       REFS       46       48       57      2*58       59       85
                                              DEFINED       45
 301  INC          INTEGER                       REFS       78       81  DEFINED       66       80
 261  IT           INTEGER                       REFS       89  DEFINED       38       52
 276  J            INTEGER                       REFS       62       63     2*87      2*88  DEFINED       60       62
                                                   86
 277  JI           INTEGER                       REFS       63  DEFINED       61
```

AD-A152 270 ESP (EXTERNAL-STORES PROGRAM) - A PILOT COMPUTER PROGRAM FOR DETERMINING..(U) GRUMMAN AEROSPACE CORP BETHPAGE NY J B SMEDFJELD FEB 85 ADCR-85-1-VOL-3-PT-1 4/8

UNCLASSIFIED N00019-81-C-0395 F/G 9/2 NL



MICROCOPY RESOLUTION TEST CHART

```
VARIABLES      SN  TYPE            RELOCATION
  300  K           INTEGER                              REFS        72      79      80  DEFINED      65      79
  264  KEY         INTEGER                              REFS        47      83 DEFINED       41      51
  303  KI          INTEGER                              REFS        73      76      78  DEFINED      68      78
  302  KK          INTEGER                              REFS        73      81 DEFINED       67      81
    0  KORE        INTEGER                F.P.          REFS        44      67      68  DEFINED      29
  273  KOUNT       INTEGER                              REFS        54      55      56       57
    0  L           INTEGER     ARRAY      F.P.          REFS        36      59      66       67      80
                                                     DEFINED        29      58
  267  LB          INTEGER                              REFS        48      59      61       84 DEFINED      44      90
  275  LEAD        INTEGER                              REFS        57      58      60
  271  LLB         INTEGER                              REFS        50      61      90  DEFINED      48      59
  274  LOC         INTEGER                              REFS        56      57 DEFINED       55
  262  LOW         INTEGER                              REFS        72      92 DEFINED       39      85
  266  LX          INTEGER                              REFS        49      50 DEFINED       43      49
    0  M           INTEGER                F.P.          REFS        40 DEFINED      29
    0  MB          INTEGER                F.P.          REFS        54      56 DEFINED       29
    0  MI          INTEGER                F.P.          REFS        64 DEFINED      29
    0  MO          INTEGER                F.P.          REFS        52 DEFINED      29
  263  MP2         INTEGER                              REFS        55 DEFINED      40
    0  MU          INTEGER                F.P.          REFS        39      45      65       66      67
                                                     DEFINED        29      92
  265  MUI         INTEGER                              REFS        45      68      69       88 DEFINED      42      69
    0  MX          INTEGER                F.P.          REFS        38 DEFINED      29
    0  N           INTEGER                F.P.          REFS        36      49      64     2*71    2*77      86      89
                                                     DEFINED        29
  305  R           REAL                                 REFS        87 DEFINED      84
  304  S           REAL                                 REFS        71      77 DEFINED       74      76
    0  T           REAL        ARRAY      F.P.          REFS        36      56    2*57       63      64      71      77
                                                          87        88      89 DEFINED       29      87
    0  X           REAL        ARRAY      F.P.          REFS        36      71      77  DEFINED      29      88

EXTERNALS          TYPE    ARGS         REFERENCES
       GETROW                4              54      56      64
       HOTDOT                8              71      77
       PUTROW                4              89
       UNPACK                5              57

STATEMENT LABELS               DEF LINE   REFERENCES
   20  90                         45          91
    0  100        INACTIVE        47        2*46
    0  110        INACTIVE        48          47
    0  120        INACTIVE        51        2*50
   34  130                        54          50
    0  140                        63          61
   72  150                        64        2*47      53
  117  160                        72          82
    0  170        INACTIVE        73        2*72
    0  180        INACTIVE        74        2*73
  125  190                        76          73
  130  200                        77          75
  145  210                        83          72
    0  220        INACTIVE        84          83
    0  230                        88          86
  165  240                        89        2*83
  174  250                        92          46
```

```
LOOPS  LABEL    INDEX     FROM-TO     LENGTH    PROPERTIES
   66  140      JI          61 63         2B     INSTACK
  161  230      J           86 88         3B     INSTACK

STATISTICS
  PROGRAM LENGTH                306B        198
        52000B CM USED
```

```
      SUBROUTINE UNFIL(JUMP)                                            UNFIL       2
C                                                                       UNFIL       3
C                                                                       UNFIL       4
      COMMON/KLUES/ KLUSE,KLUNAL,IRED,KLUMD,KLUBAL,MSADD,NPASS,IDNOPT,  UNFIL       5
     1              VDES,EPS1,DWMAX,NBAR,NFIX,D,DEL,EPS2,NCYC,NNN,IBAND, UNFIL      6
     2              IFIN,KLUB,KLUQ,MORBAL,DBAL                          UNFIL       7
      COMMON/SIZES/ NSTMEM,NSTDOF,NDYDOF,NNOPT,NDESNO,NDESYS            UNFIL       8
      COMMON/PLACES/ IUIN1,IUIN2,IUOUT1,IUOUT2,IUGO1,IUGO2,IUGO3,IUGO4, UNFIL       9
     1               IUSCR,IFSCR,IFS1,IFS2,IFS3,IFS4,IUCD,IUPR,         UNFIL      10
     2               IUA,IFA,IUY,IFY,IUMEMN,IFMEMN,IUSTFN,IFSTFN,       UNFIL      11
     3               IUKS,IFKS,IUB,IFB,IUDESO,IFDESO,                   UNFIL      12
     4               IUMDBI,IFMDBI,IUADDI,IFADDI,IUBALI,IFBALI,         UNFIL      13
     5               IUDESI,IFDESI,IUWTI,IFWTI,                         UNFIL      14
     6               IUMEMO,IFMEMO,IUBT,IFBT,                           UNFIL      15
     7               IUDESN,IFDESN,IUMD,IFMD,                           UNFIL      16
     8               IUMEMF,IFMEMF,                                     UNFIL      17
     9               IUSTFO,IFSTFO,IUMDB,IFMDB,IUADD,IFADD,IUBAL,IFBAL, UNFIL      18
     A               IUDESF,IFDESF,IUWT,IFWT,                           UNFIL      19
     B               IUDUM1,IFDUM1,IUDUM2,IFDUM2,IUDUM3,IFDUM3,         UNFIL      20
     C               IUL,IFL,IUYT,IFYT,IUZ,IFZ,IUZR,IFZR,IULR,IFLR,     UNFIL      21
     D               IUBR,IFBR,                                         UNFIL      22
     E               IUPHTF,IFPHTF,IUMODM,IFMODM,                       UNFIL      23
     F               IUMODK,IFMODK,IUPHT,IFPHT,IUQT,IFQT,IUQ,IFQ,       UNFIL      24
     G               IUPH,IFPH,IUINCM,IFINCM,IUINCK,IFINCK              UNFIL      25
      COMMON /CLIST / KOUNT,KPAGE,LINES,LINEST,KLABEL,KTPAGE,NPAGE      UNFIL      26
     1               ,KBPAGE,LINESG,KOUNTH,KOUNTI                       UNFIL      27
      COMMON /CSETUP/ IOINC                                             UNFIL      28
      COMMON /KLUFF/ KFREE                                              UNFIL      29
      COMMON /PLAYFF/ IUMDFF,IFMDFF,IUDLTI,IFDLTI,IUSLTI,IFSLTI         UNFIL      30
     1               ,IUMPLI,IFMPLI,IUTPGT,IFTPGT,IUPATF,IFPATF         UNFIL      31
     2               ,IUMPL,IFMPL,IUSLT,IFSLT,IUDLT,IFDLT               UNFIL      32
     3               ,IUQA,IFQA,IUQAT,IFQAT,IUPHA,IFPHA,IUPHAT,IFPHAT   UNFIL      33
      COMMON /LOCSTR/ IUSTRI,IFSTRI,IUMREF,IFMREF                       UNFIL      34
     1               ,IUMOD,IFMOD                                       UNFIL      35
      COMMON/ INVERT / INVERT,IUA2,IFLEX,AORD(30),IPERM(30),NSTOR(30,2) UNFIL      36
     A,IPREV,NDOFT                                                      UNFIL      37
C                                                                       UNFIL      38
C                                                                       UNFIL      39
      CALL PROGNA(4H(UNF,4HIL  ))                                       UNFIL      40
      CALL MESAGE(1,5,5HUNFIL)                                          UNFIL      41
C                                                                       UNFIL      42
      IUMREF = 12 - IOINC                                               UNFIL      43
      IFMREF=1                                                          UNFIL      44
      IUMOD=IUMREF                                                      UNFIL      45
      IFMOD=IFMREF+1                                                    UNFIL      46
C                                                                       UNFIL      47
C                                                                       UNFIL      48
      IF(JUMP.EQ.0) GO TO 10                                            UNFIL      49
      IF(JUMP.EQ.-1) GO TO 33                                           UNFIL      50
      IF(JUMP.EQ.1) GO TO 1040                                          UNFIL      51
      IF(JUMP.EQ.2) GO TO 1060                                          UNFIL      52
      IF(JUMP.EQ.25) GO TO 1080                                         UNFIL      53
      IF(JUMP.EQ.3) GO TO 1100                                          UNFIL      54
      IF(JUMP.EQ.35) GO TO 1125                                         UNFIL      55
      IF(JUMP.EQ.4) GO TO 1150                                          UNFIL      56
      IF(JUMP.EQ.5) GO TO 1200                                          UNFIL      57
      IF(JUMP.EQ.6) GO TO 1300                                          UNFIL      58
```

```
C
   10 CONTINUE
      IF(NPASS.EQ.1) GO TO 500
C
      IUGO1=1
      IUGO2=2
      IUGO3=3
      IUGO4=4
      IUIN1  =  8 - IOINC
      IUOUT1 =  9 - IOINC
      IUOUT2 = 10 - IOINC
      IUIN2  = 11 - IOINC
      IFS1=1
      IFS2=1
      IFS3=1
      IFS4=1
C
      IUA=IUIN1
      IUA2 = IUA
      IUY=IUIN1
      IUMEMN=IUIN1
      IUSTFN=IUIN1
      IUMEMF=IUOUT1
CIBM
C     CALL DINIT(13,8HFT13F001)
CIBM
      IUSCR = 13
      IUKS=IUIN1
      IUSLTI=IUIN1
      IUDLTI=IUIN1
C
      IF(IRED.EQ.0) GO TO 20
C
      IFSTFN=1
      IFMEMN=2
      IFY=3
      IFA=4
      NEXT=5
      IF(KFREE.EQ.1) GO TO 15
      IFSLTI=NEXT
      NEXT=NEXT+1
      IFDLTI=NEXT
      NEXT=NEXT+1
   15 IFSCR = 1
      IUIN1 = 13
C
      GO TO 30
C
   20 CONTINUE
      IFSTFN=1
      IFMEMN=2
      IFKS=3
      NEXT=4
      IF(KFREE.EQ.1) GO TO 25
      IFSLTI=NEXT
      IFDLTI=IFSLTI
      NEXT=NEXT+1
```

```
   25 IFSCR=NEXT                                          UNFIL    116
C                                                         UNFIL    117
   30 CONTINUE                                            UNFIL    118
      GO TO 9999                                          UNFIL    119
C                                                         UNFIL    120
C                                                         UNFIL    121
   33 CONTINUE                                            UNFIL    122
      IF(KLUSE.EQ.2) GO TO 35                             UNFIL    123
C                                                         UNFIL    124
      IF(KLUMD.EQ.1.AND.NNOPT.EQ.0) GO TO 400             UNFIL    125
      IUSTFO=IUGO1                                        UNFIL    126
      IFSTFO=1                                            UNFIL    127
      IFS1=2                                              UNFIL    128
      IUDUM3=IUSTFN+IUSTFO                                UNFIL    129
      IFDUM3=IFSTFN+IFSTFO                                UNFIL    130
      GO TO 400                                           UNFIL    131
C                                                         UNFIL    132
   35 CONTINUE                                            UNFIL    133
      IUSTFO=IUOUT2                                       UNFIL    134
      IFSTFO=1                                            UNFIL    135
      NEXT=2                                              UNFIL    136
      IUDUM3=IUSTFN+IUSTFO                                UNFIL    137
      IFDUM3=IFSTFN+IFSTFO                                UNFIL    138
      IUMEMO=IUGO1                                        UNFIL    139
      IFMEMO=1                                            UNFIL    140
      IFS1=2                                              UNFIL    141
      IUDUM1=IUMEMN+IUMEMO                                UNFIL    142
      IFDUM1=IFMEMN+IFMEMO                                UNFIL    143
      IUMEMF=IUOUT1                                       UNFIL    144
      IFMEMF=1                                            UNFIL    145
      IUDESN=IUGO2                                        UNFIL    146
      IFDESN=1                                            UNFIL    147
      IFS2=2                                              UNFIL    148
      IUDESO=IUIN1                                        UNFIL    149
      IFDESO = 2                                          UNFIL    150
      IUDUM2=IUDESN+IUDESO                                UNFIL    151
      IFDUM2=IFDESN+IFDESO                                UNFIL    152
      IF(KLUMD.EQ.0) GO TO 100                            UNFIL    153
      IUMDB=IUOUT2                                        UNFIL    154
      IFMDB=2                                             UNFIL    155
      NEXT=3                                              UNFIL    156
      GO TO 115                                           UNFIL    157
C                                                         UNFIL    158
  100 IF(MSADD.EQ.0) GO TO 115                            UNFIL    159
      IUADD=IUOUT2                                        UNFIL    160
      IFADD=2                                             UNFIL    161
      NEXT=3                                              UNFIL    162
C                                                         UNFIL    163
  115 IF(KFREE.EQ.1) GO TO 120                            UNFIL    164
      IUMPL=IUOUT2                                        UNFIL    165
      IFMPL=NEXT                                          UNFIL    166
      NEXT=NEXT+1                                         UNFIL    167
      IUSLT=IUOUT2                                        UNFIL    168
      IFSLT=NEXT                                          UNFIL    169
      NEXT=NEXT+1                                         UNFIL    170
      IUDLT=IUOUT2                                        UNFIL    171
```

```
      IF(IRED.EQ.O) GO TO 120
      IFDLT=NEXT
      NEXT=NEXT+1
C
  120 IF(KLUBAL.EQ.O) GO TO 140
      IUBAL=IUOUT2
      IFBAL=NEXT
      NEXT=NEXT+1
C
  140 IUDESF=IUOUT2
      IFDESF=NEXT
      NEXT=NEXT+1
      IUWT=IUOUT2
      IFWT=NEXT
      NEXT=NEXT+1
C
  400 CONTINUE
C
      GO TO 1000
C
C
  500 CONTINUE
C
      IUGO1=1
      IUGO2=2
      IUGO3=3
      IUGO4=4
      IUIN1=8  -IOINC
      IUOUT1=9 -IOINC
      IUOUT2=10-IOINC
      IUIN2=11 -IOINC
      IFS1=1
      IFS2=1
      IFS3=1
      IFS4=1
C
      IUA=IUIN1
      IUY=IUIN1
      IUMEMN=IUIN1
      IUSCR=IUIN1
      IUKS=IUIN1
C
      IUSTFN=IUIN2
      IFSTFN=1
      NEXT=2
      IF(KLUMD.EQ.O) GO TO 505
      IUMDBI=IUIN2
      IFMDBI=2
      NEXT=3
      GO TO 507
C
  505 IF(MSADD.EQ.O) GO TO 507
      IUADDI=IUIN2
      IFADDI=2
      NEXT=3
C
  507 IF(KFREE.EQ.1) GO TO 510
```

```
      IUMPLI=IUIN2                                  UNFIL     230
      IFMPLI=NEXT                                   UNFIL     231
      NEXT=NEXT+1                                   UNFIL     232
      IUSLTI=IUIN2                                  UNFIL     233
      IFSLTI=NEXT                                   UNFIL     234
      NEXT=NEXT+1                                   UNFIL     235
      IUDLTI=IUIN2                                  UNFIL     236
      IFDLTI=IFSLTI                                 UNFIL     237
      IF(IRED.EQ.O) GO TO 510                       UNFIL     238
      IFDLTI=NEXT                                   UNFIL     239
      NEXT=NEXT+1                                   UNFIL     240
C                                                   UNFIL     241
  510 IF(KLUBAL.EQ.O) GO TO 515                     UNFIL     242
      IUBALI=IUIN2                                  UNFIL     243
      IFBALI=NEXT                                   UNFIL     244
      NEXT=NEXT+1                                   UNFIL     245
C                                                   UNFIL     246
  515 IUDESI=IUIN2                                  UNFIL     247
      IFDESI=NEXT                                   UNFIL     248
      NEXT=NEXT+1                                   UNFIL     249
      IUWTI=IUIN2                                   UNFIL     250
      IFWTI=NEXT                                    UNFIL     251
      NEXT=NEXT+1                                   UNFIL     252
C                                                   UNFIL     253
      IF(IRED.EQ.O) GO TO 520                       UNFIL     254
C                                                   UNFIL     255
      IFMEMN=2                                      UNFIL     256
      IFY=3                                         UNFIL     257
      IFA=4                                         UNFIL     258
      IFSCR=5                                       UNFIL     259
C                                                   UNFIL     260
      GO TO 530                                     UNFIL     261
C                                                   UNFIL     262
  520 CONTINUE                                      UNFIL     263
      IFMEMN=2                                      UNFIL     264
      IFKS=3                                        UNFIL     265
      IFSCR=4                                       UNFIL     266
C                                                   UNFIL     267
  530 CONTINUE                                      UNFIL     268
C                                                   UNFIL     269
C                                                   UNFIL     270
  550 CONTINUE                                      UNFIL     271
      IUSTFO=IUOUT2                                 UNFIL     272
      IFSTFO=1                                      UNFIL     273
      NEXT=2                                        UNFIL     274
      IUDUM3=IUSTFN+IUSTFO                          UNFIL     275
      IFDUM3=IFSTFN+IFSTFO                          UNFIL     276
      IUMEMF=IUOUT1                                 UNFIL     277
      IFMEMF=1                                      UNFIL     278
      IUDESN=IUGO2                                  UNFIL     279
      IFDESN=1                                      UNFIL     280
      IFS2=2                                        UNFIL     281
      IUDESO=IL.N1                                  UNFIL     282
      IFDESO=IFSCR                                  UNFIL     283
      IUDUM2=IUDESN+IUDESO                          UNFIL     284
      IFDUM2=IFDESN+IFDESO                          UNFIL     285
      IF(KLUMD.EQ.O) GO TO 600                      UNFIL     286
```

```
      IUMDB=IUOUT2                                                      UNFIL    287
      IFMDB=2                                                           UNFIL    288
      NEXT=3                                                            UNFIL    289
      GO TO 615                                                         UNFIL    290
C                                                                       UNFIL    291
  600 IF(MSADD.EQ.O) GO TO 615                                          UNFIL    292
      IUADD=IUOUT2                                                      UNFIL    293
      IFADD=2                                                           UNFIL    294
      NEXT=3                                                            UNFIL    295
C                                                                       UNFIL    296
  615 IF(KFREE.EQ.1) GO TO 620                                          UNFIL    297
      IUMPL=IUOUT2                                                      UNFIL    298
      IFMPL=NEXT                                                        UNFIL    299
      NEXT=NEXT+1                                                       UNFIL    300
      IUSLT=IUOUT2                                                      UNFIL    301
      IFSLT=NEXT                                                        UNFIL    302
      NEXT=NEXT+1                                                       UNFIL    303
      IUDLT=IUOUT2                                                      UNFIL    304
      IFDLT=IFSLT                                                       UNFIL    305
      IF(IRED.EQ.O) GO TO 620                                           UNFIL    306
      IFDLT=NEXT                                                        UNFIL    307
      NEXT=NEXT+1                                                       UNFIL    308
C                                                                       UNFIL    309
  620 IF(KLUBAL.EQ.O) GO TO 640                                         UNFIL    310
      IUBAL=IUOUT2                                                      UNFIL    311
      IFBAL=NEXT                                                        UNFIL    312
      NEXT=NEXT+1                                                       UNFIL    313
  640 IUDESF=IUOUT2                                                     UNFIL    314
      IFDESF=NEXT                                                       UNFIL    315
      NEXT=NEXT+1                                                       UNFIL    316
      IUWT=IUOUT2                                                       UNFIL    317
      IFWT=NEXT                                                         UNFIL    318
      NEXT=NEXT+1                                                       UNFIL    319
C                                                                       UNFIL    320
 1000 CONTINUE                                                          UNFIL    321
      IUL=IUGO2                                                         UNFIL    322
      IFL=IFS2                                                          UNFIL    323
      IUYT=IUGO1                                                        UNFIL    324
      IFYT=IFS1                                                         UNFIL    325
      IUZ=IUIN1                                                         UNFIL    326
      IFZ=IFSCR                                                         UNFIL    327
      IUZR=IUGO1                                                        UNFIL    328
      IFZR=IFS1                                                         UNFIL    329
      IULR=IUIN1                                                        UNFIL    330
      IFLR=IFSCR                                                        UNFIL    331
      IUBR=IUGO2                                                        UNFIL    332
      IFBR=IFS2                                                         UNFIL    333
      IUB=IUIN1                                                         UNFIL    334
      IFB=IFSCR                                                         UNFIL    335
      IUBT=IUGO1                                                        UNFIL    336
      IFBT=IFS1                                                         UNFIL    337
C                                                                       UNFIL    338
      IUMD=IUGO2                                                        UNFIL    339
      IFMD=IFS2                                                         UNFIL    340
      IF(KFREE.EQ.1) GO TO 9999                                         UNFIL    341
      IUTPGT=IUGO2                                                      UNFIL    342
      IFTPGT=IFMD+1                                                     UNFIL    343
```

```
              IFQAT=2                                            UNFIL   401
              IUPHA=IUGO4                                        UNFIL   402
              IFPHA=2                                            UNFIL   403
              IUPHAT=IUGO3                                       UNFIL   404
              IFPHAT=2                                           UNFIL   405
              IFS3=3                                             UNFIL   406
              IFS4=3                                             UNFIL   407
              GO TO 9999                                         UNFIL   408
        C                                                        UNFIL   409
         1150 CONTINUE                                           UNFIL   410
              IFSCR=IFB+1                                        UNFIL   411
              GO TO 9999                                         UNFIL   412
        C                                                        UNFIL   413
         1200 CONTINUE                                           UNFIL   414
              IFS1=IFS1+1                                        UNFIL   415
              GO TO 9999                                         UNFIL   416
        C                                                        UNFIL   417
         1300 CONTINUE                                           UNFIL   418
              IFS1 = IFMODM                                      UNFIL   419
        C                                                        UNFIL   420
        C                                                        UNFIL   421
         9999 CONTINUE                                           UNFIL   422
        C                                                        UNFIL   423
              CALL MESAGE(2,5,5HUNFIL)                           UNFIL   424
        C                                                        UNFIL   425
              RETURN                                             UNFIL   426
              END                                                UNFIL   427
```

SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS		DEF LINE	REFERENCES
3	UNFIL	1	425

VARIABLES		SN TYPE		RELOCATION					
3	AORD	REAL	ARRAY	INVERT	REFS	35			
15	D	REAL		KLUES	REFS	4			
27	DBAL	REAL		KLUES	REFS	4			
16	DEL	REAL		KLUES	REFS	4			
12	DWMAX	REAL		KLUES	REFS	4			
11	EPS1	REAL		KLUES	REFS	4			
17	EPS2	REAL		KLUES	REFS	4			
22	IBAND	INTEGER		KLUES	REFS	4			
7	IDNOPT	INTEGER		KLUES	REFS	4			
21	IFA	INTEGER		PLACES	REFS	8	DEFINED	94	257
67	IFADD	INTEGER		PLACES	REFS	8	DEFINED	160	293
41	IFADDI	INTEGER		PLACES	REFS	8	DEFINED	225	
33	IFB	INTEGER		PLACES	REFS	8	410	DEFINED	334
71	IFBAL	INTEGER		PLACES	REFS	8	DEFINED	178	311
43	IFBALI	INTEGER		PLACES	REFS	8	DEFINED	243	
117	IFBR	INTEGER		PLACES	REFS	8	DEFINED	332	
53	IFBT	INTEGER		PLACES	REFS	8	DEFINED	336	
73	IFDESF	INTEGER		PLACES	REFS	8	DEFINED	182	314
45	IFDESI	INTEGER		PLACES	REFS	8	DEFINED	247	

```
      IUMDFF=IUG02
      IFMDFF=IFTPGT+1
C
      GO TO 9999
C
 1040 CONTINUE
      IFSCR=IFSCR+1
      IFS1=IFS1+1
      GO TO 9999
C
 1060 CONTINUE
      IF (NCYC .GT. 0) GOTO 9999
      IFS1=IFS1-1
      GO TO 9999
C
 1080 CONTINUE
      IUPHTF=IUG04
      IFPHTF=1
      IUPATF=IUG04
      IFPATF=2
      IUMODM=IUG01
      IFMODM=IFS1
      IUMODK=IUG01
      IFMODK=IFMODM+1
      GO TO 9999
C
 1100 CONTINUE
C
C
      IUMODM=IUG01
      IFMODM=IFS1
      IUMODK=IUG01
      IFMODK=IFMODM+1
      IFS1=IFMODK+1
      IUINCM=IUG01
      IFINCM=IFMODK+1
      IUINCK=IUG01
      IFINCK=IFINCM+1
C
      IUPHTF=IUG04
      IFPHTF=1
      IFS4=2
      IUPHT=IUG03
      IFPHT=1
      IFS3=2
      IUQT=IUG04
      IFQT=1
      IUQ=IUG03
      IFQ=1
      IUPH=IUG04
      IFPH=1
      GO TO 9999
 1125 CONTINUE
C
      IUQA=IUG03
      IFQA=2
      IUQAT=IUG01
```

```
VARIABLES        SN  TYPE          RELOCATION
   55  IFDESN   INTEGER            PLACES    REFS          8      151      284  DEFINED      146      279
   35  IFDESO   INTEGER            PLACES    REFS          8      151      284  DEFINED      149      282
   21  IFDLT    INTEGER            PLAYFF    REFS         29  DEFINED      171      173      304      306
    3  IFDLTI   INTEGER            PLAYFF    REFS         29  DEFINED       99      113      236      238
   77  IFDUM1   INTEGER            PLACES    REFS          8  DEFINED      142
  101  IFDUM2   INTEGER            PLACES    REFS          8  DEFINED      151      284
  103  IFDUM3   INTEGER            PLACES    REFS          8  DEFINED      129      137      275
   23  IFIN     INTEGER            KLUES     REFS          4
  141  IFINCK   INTEGER            PLACES    REFS          8  DEFINED      380
  137  IFINCM   INTEGER            PLACES    REFS          8      380  DEFINED      378
   31  IFKS     INTEGER            PLACES    REFS          8  DEFINED      109      264
  105  IFL      INTEGER            PLACES    REFS          8  DEFINED      322
    2  IFLEX    INTEGER            INVERT    REFS         35
  115  IFLR     INTEGER            PLACES    REFS          8  DEFINED      330
   57  IFMD     INTEGER            PLACES    REFS          8      342  DEFINED      339
   65  IFMDB    INTEGER            PLACES    REFS          8  DEFINED      154      287
   37  IFMDBI   INTEGER            PLACES    REFS          8  DEFINED      219
    1  IFMDFF   INTEGER            PLAYFF    REFS         29  DEFINED      344
   61  IFMEMF   INTEGER            PLACES    REFS          8  DEFINED      144      277
   25  IFMEMN   INTEGER            PLACES    REFS          8      142  DEFINED       92      108      255      263
   51  IFMEMO   INTEGER            PLACES    REFS          8      142  DEFINED      139
    5  IFMOD    INTEGER            LOCSTR    REFS         33  DEFINED       45
  125  IFMODK   INTEGER            PLACES    REFS          8      376      378  DEFINED      366      375
  123  IFMODM   INTEGER            PLACES    REFS          8      366      375      418  DEFINED      364      373
   15  IFMPL    INTEGER            PLAYFF    REFS         29  DEFINED      165      298
    7  IFMPLI   INTEGER            PLAYFF    REFS         29  DEFINED      230
    3  IFMREF   INTEGER            LOCSTR    REFS         33       45  DEFINED       43
   13  IFPATF   INTEGER            PLAYFF    REFS         29  DEFINED      362
  135  IFPH     INTEGER            PLACES    REFS          8  DEFINED      393
   27  IFPHA    INTEGER            PLAYFF    REFS         29  DEFINED      402
   31  IFPHAT   INTEGER            PLAYFF    REFS         29  DEFINED      404
  127  IFPHT    INTEGER            PLACES    REFS          8  DEFINED      386
  121  IFPHTF   INTEGER            PLACES    REFS          8  DEFINED      360      383
  133  IFQ      INTEGER            PLACES    REFS          8  DEFINED      391
   23  IFQA     INTEGER            PLAYFF    REFS         29  DEFINED      398
   25  IFQAT    INTEGER            PLAYFF    REFS         29  DEFINED      400
  131  IFQT     INTEGER            PLACES    REFS          8  DEFINED      389
   11  IFSCR    INTEGER            PLACES    REFS          8      282      326      330      334      349
                                          DEFINED      101      115      258      265      349      410
   17  IFSLT    INTEGER            PLAYFF    REFS         29      171      304  DEFINED      168      301
    5  IFSLTI   INTEGER            PLAYFF    REFS         29      113      236  DEFINED       97      112      233
   27  IFSTFN   INTEGER            PLACES    REFS          8      129      137      275  DEFINED       91      107
                                               215
   63  IFSTFO   INTEGER            PLACES    REFS          8      129      137      275  DEFINED      126      134
                                               272
    1  IFSTRI   INTEGER            LOCSTR    REFS         33
   12  IFS1     INTEGER            PLACES    REFS          8      324      328      336      350      355      364
                                               373       414  DEFINED       70      127      140      203      350
                                               355       376      414      418
   13  IFS2     INTEGER            PLACES    REFS          8      322      332      339  DEFINED       71      147
                                               204       280
   14  IFS3     INTEGER            PLACES    REFS          8  DEFINED       72      205      387      405
   15  IFS4     INTEGER            PLACES    REFS          8  DEFINED       73      206      384      406
   11  IFTPGT   INTEGER            PLAYFF    REFS         29      344  DEFINED      342
   75  IFWT     INTEGER            PLACES    REFS          8  DEFINED      185      317
   47  IFWTI    INTEGER            PLACES    REFS          8  DEFINED      250
   23  IFY      INTEGER            PLACES    REFS          8  DEFINED       93      256
```

```
VARIABLES      SN   TYPE               RELOCATION
   107  IFYT        INTEGER                 PLACES      REFS         8   DEFINED       324
   111  IFZ         INTEGER                 PLACES      REFS         8   DEFINED       326
   113  IFZR        INTEGER                 PLACES      REFS         8   DEFINED       328
     0  INVERT      INTEGER                 INVERT      REFS        35
     0  IOINC       INTEGER                 CSETUP      REFS        27        42        66        67        68        69       199
                                                         200       201       202
    41  IPERM       INTEGER     ARRAY       INVERT      REFS        35
   173  IPREV       INTEGER                 INVERT      REFS        35
     2  IRED        INTEGER                 KLUES       REFS         4        89       172       237       253       305
    20  IUA         INTEGER                 PLACES      REFS         8        76   DEFINED        75       208
    66  IUADD       INTEGER                 PLACES      REFS         8   DEFINED       159       292
    40  IUADDI      INTEGER                 PLACES      REFS         8   DEFINED       224
     1  IUA2        INTEGER                 INVERT      REFS        35   DEFINED        76
    32  IUB         INTEGER                 PLACES      REFS         8   DEFINED       333
    70  IUBAL       INTEGER                 PLACES      REFS         8   DEFINED       177       310
    42  IUBALI      INTEGER                 PLACES      REFS         8   DEFINED       242
   116  IUBR        INTEGER                 PLACES      REFS         8   DEFINED       331
    52  IUBT        INTEGER                 PLACES      REFS         8   DEFINED       335
    16  IUCD        INTEGER                 PLACES      REFS         8
    72  IUDESF      INTEGER                 PLACES      REFS         8   DEFINED       181       313
    44  IUDESI      INTEGER                 PLACES      REFS         8   DEFINED       246
    54  IUDESN      INTEGER                 PLACES      REFS         8       150       283   DEFINED       145       278
    34  IUDESO      INTEGER                 PLACES      REFS         8       150       283   DEFINED       148       281
    20  IUDLT       INTEGER                 PLAYFF      REFS        29   DEFINED       170       303
     2  IUDLTI      INTEGER                 PLAYFF      REFS        29   DEFINED        87       235
    76  IUDUM1      INTEGER                 PLACES      REFS         8   DEFINED       141
   100  IUDUM2      INTEGER                 PLACES      REFS         8   DEFINED       150       283
   102  IUDUM3      INTEGER                 PLACES      REFS         8   DEFINED       128       136       274
     4  IUGO1       INTEGER                 PLACES      REFS         8       125       138       323       327       335       363
                                                         365       372       374       377       379   DEFINED        62       195
     5  IUGO2       INTEGER                 PLACES      REFS         8       145       278       321       331       338       341
                                                         343   DEFINED        63       196
     6  IUGO3       INTEGER                 PLACES      REFS         8       385       390       397       403
                                                     DEFINED        64       197
     7  IUGO4       INTEGER                 PLACES      REFS         8       359       361       382       388       392       399
                                                         401   DEFINED        65       198
   140  IUINCK      INTEGER                 PLACES      REFS         8   DEFINED       379
   136  IUINCM      INTEGER                 PLACES      REFS         8   DEFINED       377
     0  IUIN1       INTEGER                 PLACES      REFS         8        75        77        78        79        85        86
                                                          87       148       208       209       210       211       212       281
                                                         325       329       333   DEFINED        66       102       199
     1  IUIN2       INTEGER                 PLACES      REFS         8       214       218       224       229       232       235
                                                         242       246       249   DEFINED        69       202
    30  IUKS        INTEGER                 PLACES      REFS         8   DEFINED        85       212
   104  IUL         INTEGER                 PLACES      REFS         8   DEFINED       321
   114  IULR        INTEGER                 PLACES      REFS         8   DEFINED       329
    56  IUMD        INTEGER                 PLACES      REFS         8   DEFINED       338
    64  IUMDB       INTEGER                 PLACES      REFS         8   DEFINED       153       286
    36  IUMDBI      INTEGER                 PLACES      REFS         8   DEFINED       218
     0  IUMDFF      INTEGER                 PLAYFF      REFS        29   DEFINED       343
    60  IUMEMF      INTEGER                 PLACES      REFS         8   DEFINED        80       143       276
    24  IUMEMN      INTEGER                 PLACES      REFS         8       141   DEFINED        78       210
    50  IUMEMO      INTEGER                 PLACES      REFS         8       141   DEFINED       138
     4  IUMOD       INTEGER                 LOCSTR      REFS        33   DEFINED        44
   124  IUMODK      INTEGER                 PLACES      REFS         8   DEFINED       365       374
   122  IUMODM      INTEGER                 PLACES      REFS         8   DEFINED       363       372
```

```
VARIABLES      SN  TYPE           RELOCATION
                                              82       86       93  DEFINED       29
  124  INDEX      INTEGER                   REFS       57       77       78       93  DEFINED       45       57
                                              93
  137  INDEX2     INTEGER                   REFS       84       91  DEFINED       78
  127  INO        INTEGER                   REFS       56       72  DEFINED       55       71
  126  INX        INTEGER                   REFS       50       51       53       61       65       67       70
                                              71  DEFINED       47       53       61       67
  132  IST        INTEGER                   REFS       72  DEFINED       70
  133  IX         INTEGER                   REFS       73  DEFINED       72
  141  JEND       INTEGER                   REFS       87       90  DEFINED       86
  136  JNX        INTEGER                   REFS       81       82       83       84       85     2*86       91
                                         DEFINED       77       83       90
    0  JROW       INTEGER          F.P.     REFS       44  DEFINED       29
  140  JST        INTEGER                   REFS       87  DEFINED       85
  135  J2CT       INTEGER                   REFS       82     2*88       89  DEFINED       76       82       89
  130  K          INTEGER                   REFS       88  DEFINED       56       87
    0  KROW       INTEGER          F.P      REFS       59       94  DEFINED       29
  125  LOCSUM     INTEGER                   REFS       51       52       55       66       68       70
                                         DEFINED       46       51       68
  131  NACT       INTEGER                   REFS       66       67       68       71  DEFINED       65
  123  NROW       INTEGER                   REFS       52       55       58       59       66       70       92
                                              94  DEFINED       44       58       92

STATEMENT LABELS               DEF LINE   REFERENCES
   14  15                         48         54       62       69
    0  20           INACTIVE      50
   23  25                         55         52
    0  30                         60         56
   40  35                         65         50
   45  36                         67         66       96
   51  40                         70       2*66
    0  46           INACTIVE      76       2*74
   64  50                         79       2*84     2*91
    0  52           INACTIVE      82       2*81
   73  54                         85         81
    0  58                         89         87
  113  60                         92         74       84       91
    0  65                         95         72

LOOPS  LABEL    INDEX     FROM-TO     LENGTH    PROPERTIES
   27  30       K           56 60         7B
   56  65       IX          72 95        44B                  NOT INNER
  103  58       K           87 89         3B      INSTACK

STATISTICS
  PROGRAM LENGTH             155B      109
          52000B CM USED
```

```
      NROW=NROW+1                                                      ENMMPY  59
      IF (NROW.GT.KROW) RETURN                                         ENMMPY  60
   30 CONTINUE                                                         ENMMP/  61
      INX=INX+1                                                        ENMMPY  62
      GO TO 15                                                         ENMMPY  63
C**35 NA=IBUFF(INX)                                                    ENMMPY  64
C     NACT = NUMBER OF NON-ZERO ELEMENTS IN THIS STRING                ENMMPY  65
   35 NACT=IBUFF(INX)                                                  ENMMPY  66
      IF (LOCSUM+NACT-NROW) 36,40,40                                   ENMMPY  67
   36 INX=INX+NACT+1                                                   ENMMPY  68
      LOCSUM=LOCSUM+NACT                                               ENMMPY  69
      GO TO 15                                                         ENMMPY  70
   40 IST=INX+NROW-LOCSUM                                              ENMMPY  71
      INO=INX+NACT                                                     ENMMPY  72
      DO 65 IX=IST,INO                                                 ENMMPY  73
      A=BUFFER(IX)                                                     ENMMPY  74
      IF (A) 46,60,46                                                  ENMMPY  75
C         MULTIPLY THIS ELEMENT BY A ROW OF MATRIX B TO GET PARTIALS   ENMMPY  76
   46 J2CT = 1                                                         ENMMPY  77
      JNX=INDEX+1                                                      ENMMPY  78
      INDEX2=IBUFF(INDEX)-1                                            ENMMPY  79
   50     CONTINUE                                                     ENMMPY  80
C      BEGIN LOOP ON A ROW OF B, END AT 60                             ENMMPY  81
      IF (IBUFF(JNX)) 52,52,54                                         ENMMPY  82
   52 J2CT=J2CT-IBUFF(JNX)                                             ENMMPY  83
      JNX=JNX+1                                                        ENMMPY  84
      IF (JNX-INDEX2) 50,50,60                                         ENMMPY  85
   54 JST=JNX+1                                                        ENMMPY  86
      JEND=JNX+IBUFF(JNX)                                              ENMMPY  87
      DO 58 K=JST,JEND                                                 ENMMPY  88
      DBUFF(J2CT)=DBUFF(J2CT)+A*BUFFER(K)                              ENMMPY  89
   58 J2CT=J2CT+1                                                      ENMMPY  90
      JNX=JEND+1                                                       ENMMPY  91
      IF (JNX-INDEX2) 50,50,60                                         ENMMPY  92
   60 NROW=NROW+1                                                      ENMMPY  93
      INDEX=IBUFF(INDEX)                                               ENMMPY  94
      IF (NROW.GT.KROW) RETURN                                         ENMMPY  95
   65 CONTINUE                                                         ENMMPY  96
      GO TO 36                                                         ENMMPY  97
      END                                                              ENMMPY  98
```

SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS	DEF LINE	REFERENCES	
3 ENMMPY	29	59	94

VARIABLES	SN	TYPE		RELOCATION								
134	A	REAL			REFS	74	88	DEFINED	73			
0	BUFFER	REAL	ARRAY	F.P.	REFS	36	73	88	DEFINED	29		
0	DBUFF	REAL	ARRAY	F.P.	REFS	37	88	DEFINED	29	88		
0	IAST	INTEGER		F.P	REFS	47	DEFINED	29				
0	IBST	INTEGER		F.P.	REFS	45	DEFINED	29				
0	IBUFF	INTEGER	ARRAY	F.P.	REFS	38	50	51	57	65	78	81

```
C45700, SUB. ENMMPY (MULTIPLY TOGETHER TWO MATRICES IN CORE)            ENMMPY     2
C                                                                        ENMMPY     3
C*********************************************************************** ENMMPY     4
C                                                                      * ENMMPY     5
C***  SUBROUTINE ENMMPY (BUFFER,IBUFF ,DBUFF ) ************************** ENMMPY     6
C                                                                      * ENMMPY     7
C***  OBJECTIVE  ******************************************************** ENMMPY     8
C     ---------                                                        * ENMMPY     9
C     MULTIPLIES TOGETHER TWO MATRICES STORED IN CORE TO PRODUCE THE   * ENMMPY    10
C     PARTIAL PRODUCT OF TWO LARGER MATRICES THAT DO NOT FIT IN CORE.  * ENMMPY    11
C     THE MULTIPLICATION IS CARRIED OUT IN PACKED FORM.  THAT IS,      * ENMMPY    12
C     STRING OF ZEROES ARE NOT MULTIPLIED EXPLICITLY.  THE STORAGE FOR * ENMMPY    13
C     THIS SUBROUTINE IS CONTROLLED BY MULT.                           * ENMMPY    14
C                                                                      * ENMMPY    15
C***  INPUT/OUTPUT  ***************************************************** ENMMPY    16
C     ------------                                                     * ENMMPY    17
C     THIS SUBROUTINE RECEIVES TWO MATRICES FROM THE CALLING ROUTINE   * ENMMPY    18
C     MULT AND RETURNS WITH THE PRODUCT MATRIX.                        * ENMMPY    19
C                                                                      * ENMMPY    20
C***  SUMMARY OF SYMBOLS  *********************************************** ENMMPY    21
C     ------------------                                               * ENMMPY    22
C                                                                      * ENMMPY    23
C***  ERROR MESSAGES  *************************************************** ENMMPY    24
C     --------------                                                   * ENMMPY    25
C     NONE.                                                              ENMMPY    26
C                                                                      * ENMMPY    27
C*********************************************************************** ENMMPY    28
C                                                                        ENMMPY    29
      SUBROUTINE ENMMPY (BUFFER,IBUFF,DBUFF,IAST,IBST,JROW,KROW)         ENMMPY    30
C                                                                        ENMMPY    31
C                                                                        ENMMPY    32
CIBM  BEGINNING OF TYPE STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS ENMMPY    33
C     DOUBLE PRECISION DBUFF, A                                          ENMMPY    34
CIBM  ENDING OF TYPE STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS    ENMMPY    35
C                                                                        ENMMPY    36
      DIMENSION BUFFER(1)                                                ENMMPY    37
      DIMENSION DBUFF(1)                                                 ENMMPY    38
      DIMENSION IBUFF(1)                                                 ENMMPY    39
C                                                                        ENMMPY    40
C     IAST = START OF MATRIX A                                           ENMMPY    41
C     IBST = START OF MATRIX B                                           ENMMPY    42
C     JROW = FIRST ROW OF B IN CORE                                      ENMMPY    43
C     KROW = LAST ROW OF B IN CORE                                       ENMMPY    44
      NROW=JROW                                                          ENMMPY    45
      INDEX=IBST                                                         ENMMPY    46
      LOCSUM=0                                                           ENMMPY    47
      INX=IAST                                                           ENMMPY    48
   15     CONTINUE                                                       ENMMPY    49
C     MULTIPLY IN PACKED FORM                                            ENMMPY    50
   20 IF (IBUFF(INX).GT.0) GO TO 35                                      ENMMPY    51
      LOCSUM=LOCSUM-IBUFF(INX)                                           ENMMPY    52
      IF (LOCSUM.GE.NROW) GO TO 25                                       ENMMPY    53
      INX=INX+1                                                          ENMMPY    54
      GO TO 15                                                           ENMMPY    55
   25 INO=LOCSUM+1-NROW                                                  ENMMPY    56
      DO 30 K=1,INO                                                      ENMMPY    57
      INDEX=IBUFF(INDEX)                                                 ENMMPY    58
```

```
STATEMENT LABELS                DEF LINE   REFERENCES
  244   100                        177        175
  240   101                        176        173
  123   200                        131        126
  260   205                        184        191
  302   210                        192        178
  570   250       FMT              212        181
  305   777                        195         82
  576   778       FMT              214        197
  314   1000                       199        194

LOOPS  LABEL      INDEX      FROM-TO     LENGTH     PROPERTIES
  132  17         J2CT        137 138        2B      INSTACK
  226  74         M           171 172        2B      INSTACK

COMMON BLOCKS   LENGTH     MEMBERS - BIAS NAME(LENGTH)
       COMRWP        3                0 ITAPER (1)               1 ITAPEW (1)               2 ITAPEP (1)
       CLIST        11                0 KOUNT  (1)               1 KPAGE  (1)               2 LINES  (1)
                                      3 LINEST (1)               4 KLABEL (1)               5 KTPAGE (1)
                                      6 NPAGE  (1)               7 KBPAGE (1)               8 LINESG (1)
                                      9 KOUNTH (1)              10 KOUNTI (1)
       CONSTS        2                0 NO     (1)               1 YES    (1)
       FILE         20                0 IPOS   (20)

STATISTICS
  PROGRAM LENGTH                 716B      462
  CM LABELED COMMON LENGTH        44B       36
         52000B CM USED
```

```
VARIABLES      SN  TYPE          RELOCATION
     0  MATNAM    INTEGER    ARRAY     F.P.        REFS      63      121      125      129      161      173
                                                DEFINED      41
     0  MAT1      INTEGER              F.P.        REFS      77       78      144      162      163      200
                                                DEFINED      41
     0  MAT2      INTEGER              F.P.        REFS      79       80      100      104      201
                                                DEFINED      41
   645  MIN       INTEGER                          REFS     140      158      160      161  DEFINED      157
   631  MOUT      INTEGER                          REFS     120      121      149      151      157
                                                DEFINED      93      158
     0  MTEMP1    INTEGER              F.P.        REFS      92       93      203  DEFINED       41
     0  MTEMP2    INTEGER              F.P.        REFS      92      204  DEFINED       41
   657  NAME      INTEGER    ARRAY                 REFS      64       78      163
   661  NAME1     INTEGER    ARRAY                 REFS      64       80
   654  NEXT      INTEGER                          REFS     189  DEFINED      185
   643  NFANS     INTEGER                          REFS     125  DEFINED      124
   613  NFMAT1    INTEGER                          REFS      78      163  DEFINED       77      162
   616  NFMAT2    INTEGER                          REFS      80  DEFINED       79
   650  NFMIN     INTEGER                          REFS     161  DEFINED      160
   642  NFMOUT    INTEGER                          REFS     121  DEFINED      120
     0  NO        INTEGER            CONSTS        REFS      69
     6  NPAGE     INTEGER            CLIST         REFS      67
   627  NROW      INTEGER                          REFS     108      109      110  DEFINED       91      108      165
     1  YES       INTEGER            CONSTS        REFS      44       69
        VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS              TYPE    ARGS        REFERENCES
        DCLOSE                   1            151      200      201      202      203      204
        ENMMPY                   7            145
        GEDLAB                   6             78       80      161      163
        GETROW                   4            100      104      140      144
        MESAGE                   3             74      206
        PROGNA                   2             73
        PUDLAB                   6            121      125
        PUTROW                   4            149      174      176
        TIMEB                    2             75      205
        TITLES                   1            128      154      180      188      196

STATEMENT LABELS               DEF LINE    REFERENCES
     0  1            INACTIVE      84
   123  2                         133         122      150      193
     0  4            INACTIVE     120         119
   103  6                         123       2*119
   562  7        FMT              211         155
    45  10                        100         109
    54  12                        103         102      168
    71  15                        110       2*102    2*109
   126  16                        137          95      134
     0  17                        138         137
   135  18                        140         134      159
   140  20                        143         139
     0  25          INACTIVE      144
   155  71                        149          97      148
   221  73                        169         123      148
     0  74                        172         171
   573  80       FMT              213         189
   553  81       FMT              210         129
     0  99          INACTIVE      216
```

```
VARIABLES       SN  TYPE            RELOCATION
    0  BUFFER       REAL      ARRAY      F.P.      REFS       60      104      140      144      145      149      174
                                                    176      189  DEFINED       41      172
    0  DBUFF        REAL      ARRAY      F.P.      REFS       61      145      172  DEFINED       41      138
  636  DUMMY     *  REAL                           REFS      100
  641  I            INTEGER                        REFS      133      150      181      193  DEFINED      116      133
  623  IAST         INTEGER                        REFS       87      145  DEFINED       86
  625  IBST         INTEGER                        REFS      145  DEFINED       89
    0  IBUFF        INTEGER   ARRAY      F.P.      REFS       62      107      145  DEFINED       41      106
  637  ICOUNT       INTEGER                        REFS      100      102      104      105      106
  646  ICT          INTEGER                        REFS      144      161
  656  IND          INTEGER                        REFS      197  DEFINED      195
  634  INDEX        INTEGER                        REFS      104    2*106      107  DEFINED       98      107      166
  651  INO       *  INTEGER                        REFS      161
  630  IO           INTEGER                        REFS      158  DEFINED       92
    0  IPOS         INTEGER   ARRAY      FILE      REFS       62       70       77       79      120      124      160
                                                    162
    0  IPRINT       INTEGER              F.P.      REFS      126      178  DEFINED       41
  632  IREAD        INTEGER                        REFS      134  DEFINED       95      159
  614  IR1          INTEGER                        REFS       78      121      125      129      150      163      193
  617  IR2          INTEGER                        REFS       80       82      109      119
  621  ISIZE        INTEGER                        REFS       99      167  DEFINED       83
  624  ISTART       INTEGER                        REFS       89       98       99      166      167
                                                DEFINED       87
    2  ITAPEP       INTEGER              COMRWP    REFS       66
    0  ITAPER       INTEGER              COMRWP    REFS       66
    1  ITAPEW       INTEGER              COMRWP    REFS       66  I/O REFS     129      155      181      189      197
  633  IWRITE       INTEGER                        REFS      148  DEFINED       97      123
  655  J            INTEGER                        REFS      189  DEFINED      189
  615  JC1          INTEGER                        REFS       78       82       87      163
  620  JC2          INTEGER                        REFS       80     2*84      121      125      129      137      171
                                                    174      176    2*187      191
  622  JC2X2        INTEGER                        REFS       86      140      144      149  DEFINED       84
  626  JROW         INTEGER                        REFS      145  DEFINED       90      164
  644  J2CT         INTEGER                        REFS      138  DEFINED      137
    7  KBPAGE       INTEGER              CLIST     REFS       67
    4  KLABEL       INTEGER              CLIST     REFS       67
    0  KOUNT        INTEGER              CLIST     REFS       67      130      152      156      179      182      190
                                                    198  DEFINED      127      130      153      156      179      182
                                                    190      198
   11  KOUNTH       INTEGER              CLIST     REFS       67
   12  KOUNTI       INTEGER              CLIST     REFS       67
    1  KPAGE        INTEGER              CLIST     REFS       67
  640  KROW         INTEGER                        REFS      119      145      164      165  DEFINED      110
    5  KTPAGE       INTEGER              CLIST     REFS       67
  647  LAFT         INTEGER                        REFS      153  DEFINED      152
  653  LAST         INTEGER                        REFS      185      186      187      189      191
                                                DEFINED      183      186      187
    2  LINES        INTEGER              CLIST     REFS       67      127      152      153    2*179
   10  LINESG       INTEGER              CLIST     REFS       67
    3  LINEST       INTEGER              CLIST     REFS       67
  635  LOCEMP       INTEGER                        REFS      102      105  DEFINED       99      105      167
    0  LSIZE        INTEGER              F.P.      REFS       83  DEFINED       41
  652  M            INTEGER                        REFS    2*172  DEFINED      171
    0  MATANS       INTEGER              F.P.      REFS      124      125      174      176      202
                                                DEFINED       41
  525  MATN         INTEGER                        REFS      173  DEFINED       76
```

```
   74 BUFFER(M)=DBUFF(M)                                              MULT
      IF(MATNAM(1).EQ.MATN) GO TO 101                                 MULT
      CALL PUTROW (MATANS,1,BUFFER,JC2)                               MULT
      GO TO 100                                                       MULT
  101 CALL PUTROW (MATANS,2,BUFFER,JC2)                               MULT
  100 CONTINUE                                                        MULT
      IF(IPRINT.NE.1) GO TO 210                                       MULT
      IF((LINES-KOUNT).LT.2) KOUNT=LINES                              MULT
      CALL TITLES(2)                                                  MULT
      WRITE(ITAPEW,250) I                                             MULT
      KOUNT=KOUNT+2                                                   MULT
      LAST=0                                                          MULT
  205 CONTINUE                                                        MULT
      NEXT=LAST+1                                                     MULT
      LAST=LAST+8                                                     MULT
      IF(LAST.GT.JC2) LAST=JC2                                        MULT
      CALL TITLES(2)                                                  MULT
      WRITE(ITAPEW,80) (BUFFER(J),J=NEXT,LAST)                        MULT
      KOUNT=KOUNT+1                                                   MULT
      IF(LAST.LT.JC2) GO TO 205                                       MULT
  210 CONTINUE                                                        MULT
      IF(I.LT.IR1) GO TO 2                                            MULT
      GO TO 1000                                                      MULT
  777 IND=31                                                          MULT
      CALL TITLES(2)                                                  MULT
      WRITE(ITAPEW,778) IND                                           MULT
      KOUNT=KOUNT+1                                                   MULT
 1000 CONTINUE                                                        MULT
      CALL DCLOSE (MAT1)                                              MULT
      CALL DCLOSE (MAT2)                                              MULT
      CALL DCLOSE (MATANS)                                            MULT
      CALL DCLOSE (MTEMP1)                                            MULT
      CALL DCLOSE (MTEMP2)                                            MULT
      CALL TIMEB (9,9HFROM MULT)                                      MULT
      CALL MESAGE (2, 4, 4HMULT)                                      MULT
C                                                                     MULT
C FORMAT STATEMENTS                                                   MULT
C                                                                     MULT
   81 FORMAT(10X, 9HMATRIX ( ,2A4,4H )  ,I4,7H ROWS, ,I4,8H COLUMNS,/) MULT
    7 FORMAT(/,10X,   41HTOTAL MATRIX EXCEEDS CORE STORAGE..(MULT))    MULT
  250 FORMAT(/,10X,    3HI= ,I5)                                      MULT
   80 FORMAT(10X,1P8E15.6)                                            MULT
  778 FORMAT(10X,10(1H*),  16HDIMENSION ERROR ,I4,10(1H*))            MULT
C                                                                     MULT
   99 RETURN                                                          MULT
      END                                                             MULT
```

SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS	DEF LINE	REFERENCES
3 MULT	41	216

```
C     KROW = LAST ROW OF B IN CORE
      I=0
C     IF THIS IS THE LAST TIME THROUGH - WRITE MATRIX LABEL FOR C;
C     IF NOT - WRITE SCRATCH MATRIX LABEL
      IF (KROW-IR2) 4,6,6
    4 NFMOUT =  IPOS(MOUT)
      CALL PUDLAB (8HMULT  O1,MOUT,MATNAM,NFMOUT,IR1,JC2)
      GO TO 2
    6 ASSIGN 73 TO IWRITE
      NFANS  =  IPOS(MATANS)
      CALL PUDLAB (8HMULT  O2,MATANS,MATNAM,NFANS,IR1,JC2)
      IF(IPRINT.NE.1) GO TO 200
      KOUNT=LINES
      CALL TITLES(2)
      WRITE(ITAPEW,81) MATNAM,IR1,JC2
      KOUNT=KOUNT+2
  200 CONTINUE
C     LOOP ON ROWS
    2 I=I+1
      GO TO IREAD,(16,18)
C      LI CONTROLS USE OF SCRATCH TAPES OR DISKS
C     INITIALIZE C TO ZERO OR PREVIOUS C
   16 DO 17 J2CT=1,JC2
   17 DBUFF(J2CT)=0.
      GO TO 20
   18 CALL GETROW (MIN,1,BUFFER,JC2X2)
C      FIRST JC2X2 LOCATIONS OF BUFFER ARE FOR
C      DOUBLE PRECISION ACCUMULATION OF MATANS
   20 CONTINUE
   25 CALL GETROW (MAT1,0,BUFFER(JC2X2+1),ICT)
      CALL ENMMPY (BUFFER,IBUFF,DBUFF,IAST,IBST,JROW,KROW)
C         THIS ROUTINE MULTIPLIED A ROW OF MAT1 BY A PARTITION OF MAT2
C         GENERATING A PARTIAL ROW OF ANSWER
      GO TO IWRITE,(71,73)
   71 CALL PUTROW (MOUT,2,BUFFER,JC2X2)
      IF(I.LT.IR1) GO TO 2
      CALL DCLOSE (MOUT)
      LAFT=LINES-KOUNT
      IF(LAFT.LT.2) KOUNT=LINES
      CALL TITLES(2)
      WRITE(ITAPEW,7)
      KOUNT=KOUNT+2
      MIN=MOUT
      MOUT=IO-MIN
      ASSIGN 18 TO IREAD
      NFMIN  =  IPOS(MIN)
      CALL GEDLAB (8HMULT  O3,MIN ,MATNAM,NFMIN ,ICT,INO)
      NFMAT1 =  IPOS(MAT1)
      CALL GEDLAB (8HMULT  O4,MAT1,NAME  ,NFMAT1,IR1,JC1)
      JROW=KROW+1
      NROW=KROW
      INDEX=ISTART+1
      LOCEMP=ISIZE-ISTART
      GO TO 12
   73     CONTINUE
C     TRUNCATE TO SINGLE PRECISION FOR FINAL ANSWER
```

```
CIBM  ENDING OF TYPE STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS   MULT      59
C                                                                       MULT      60
      DIMENSION BUFFER(1)                                               MULT      61
      DIMENSION DBUFF(1)                                                MULT      62
      DIMENSION IBUFF(1)          ,IPOS(20)                             MULT      63
      DIMENSION MATNAM(2)                                               MULT      64
      DIMENSION NAME(2)           ,NAME1(2)                             MULT      65
C                                                                       MULT      66
      COMMON /COMRWP/ ITAPER,ITAPEW,ITAPEP                              MULT      67
      COMMON /CLIST / KOUNT ,KPAGE ,LINES ,LINEST,KLABEL,KTPAGE,NPAGE   MULT      68
     1                ,KBPAGE,LINESG,KOUNTH,KOUNTI                      MULT      69
      COMMON /CONSTS/ NO    ,YES                                        MULT      70
      COMMON /FILE  / IPOS                                              MULT      71
C                                                                       MULT      72
C DATA INITIALIZATION                                                   MULT      73
      CALL PROGNA (4H(MUL,4HT  ))                                       MULT      74
      CALL MESAGE (1,28,28HMULT - MULTIPLY TWO MATRICES)                MULT      75
      CALL TIMEB (11,11HFROM MULT  )                                    MULT      76
      DATA MATN/4HCORN/                                                 MULT      77
      NFMAT1 =  IPOS(MAT1)                                              MULT      78
      CALL GEDLAB (8HMULT  O1,MAT1,NAME  ,NFMAT1,IR1,JC1)               MULT      79
      NFMAT2 =  IPOS(MAT2)                                              MULT      80
      CALL GEDLAB (8HMULT  O2,MAT2,NAME1 ,NFMAT2,IR2,JC2)               MULT      81
C         TEST DIMENSIONS FOR CONFORMABILITY                            MULT      82
      IF (JC1.NE.IR2) GO TO 777                                         MULT      83
      ISIZE = LSIZE                                                     MULT      84
    1 JC2X2=JC2+JC2                                                     MULT      85
C         ALLOCATE SPACE FOR A DOUBLE PRECISION ROW OF ANSWER           MULT      86
      IAST=JC2X2+1                                                      MULT      87
      ISTART=IAST+JC1                                                   MULT      88
C         ALLOCATE SPACE FOR A ROW OF MAT1                              MULT      89
      IBST=ISTART+1                                                     MULT      90
      JROW=1                                                            MULT      91
      NROW=0                                                            MULT      92
      IO=MTEMP1+MTEMP2                                                  MULT      93
      MOUT=MTEMP1                                                       MULT      94
C     ZERO OUT OR READ C                                                MULT      95
      ASSIGN 16 TO IREAD                                                MULT      96
C     GENERATE INTERMEDIATE OR FINAL RESULTS                            MULT      97
      ASSIGN 71 TO IWRITE                                               MULT      98
      INDEX=ISTART+1                                                    MULT      99
      LOCEMP=ISIZE-ISTART                                               MULT     100
   10 CALL GETROW (MAT2,-1,DUMMY,ICOUNT)                                MULT     101
C         FIND OUT IF ANOTHER ROW OF MAT2 WILL FIT                      MULT     102
      IF (LOCEMP-ICOUNT) 15,15,12                                       MULT     103
   12     CONTINUE                                                      MULT     104
      CALL GETROW (MAT2,0,BUFFER(INDEX+1),ICOUNT)                       MULT     105
      LOCEMP=LOCEMP-ICOUNT-1                                            MULT     106
      IBUFF(INDEX)=INDEX+ICOUNT+1                                       MULT     107
      INDEX=IBUFF(INDEX)                                                MULT     108
      NROW=NROW+1                                                       MULT     109
      IF (NROW-IR2) 10,15,15                                            MULT     110
   15 KROW=NROW                                                         MULT     111
C      HAVE A PARTITION OF MATRIX MAT2 IN BUFFER                        MULT     112
C     IAST = START OF MATRIX A                                          MULT     113
C     IBST = START OF MATRIX B                                          MULT     114
C     JROW = FIRST ROW OF B IN CORE                                     MULT     115
```

```
C45700. SUB  MULT (MULTIPLY TOGETHER TWO MATRICES READ FROM TAPE)        MULT     2
C                                                                        MULT     3
C*********************************************************************** MULT     4
C                                                                      * MULT     5
C***  SUBROUTINE MULT   (MAT1  ,MAT2  ,MATANS,MTEMP1,MTEMP2,MATNAM     * MULT     6
C                        ,IPRINT)                                      * MULT     7
C                                                                      * MULT     8
C***  COMPUTER VERSION  *********************************************** MULT     9
C     ----------------                                                 * MULT    10
C     IBM .... INCLUDES DOUBLE PRECISION TYPE STATEMENTS.  COLUMN ONE  * MULT    11
C              SHOULD BE BLANK.                                        * MULT    12
C                                                                      * MULT    13
C     CDC .... DOES NOT INCLUDE DOUBLE PRECISION TYPE STATEMENTS.      * MULT    14
C              THESE STATEMENTS ARE CONVERTED INTO COMMENTS BY         * MULT    15
C              INSERTING THE LETTER C IN COLUMN ONE.                   * MULT    16
C                                                                      * MULT    17
C***  OBJECTIVE  ****************************************************** MULT    18
C     ---------                                                        * MULT    19
C     MULTIPLIES TOGETHER TWO MATRICES, NEITHER OF WHICH FIT IN CORE   * MULT    20
C     STORAGE, TO FORM A NEW MATRIX C = A TIMES B.  ONE ROW OF A IS    * MULT    21
C     READ INTO CORE AT A TIME, AND AS MUCH OF THE B MATRIX AS WILL FIT* MULT    22
C     IS READ IN.  THE SUBROUTINE BECOMES RATHER SLOW IF ALL OF THE B  * MULT    23
C     MATRIX WILL NOT FIT.  THE SUBROUTINE MULT ONLY CONTROLS THE TAPE * MULT    24
C     MANIPULATION AND STORAGE.  THE ACTUAL MANIPULATION IS CARRIED    * MULT    25
C     OUT IN THE CALLED SUBROUTINE MMPY.                               * MULT    26
C                                                                      * MULT    27
C***  INPUT/OUTPUT  *************************************************** MULT    28
C     ------------                                                     * MULT    29
C     THE SUBROUTINE READS IN THE A AND B MATRICES AND OUTPUTS THE     * MULT    30
C     ANSWER MATRIX, C.                                                * MULT    31
C                                                                      * MULT    32
C***  SUMMARY OF SYMBOLS  ********************************************* MULT    33
C     ------------------                                               * MULT    34
C                                                                      * MULT    35
C***  ERROR MESSAGES  ************************************************* MULT    36
C     --------------                                                   * MULT    37
C     **** DIMENSION ERROR --- ****.                                   * MULT    38
C                                                                      * MULT    39
C*********************************************************************** MULT    40
C                                                                        MULT    41
      SUBROUTINE MULT (LSIZE,BUFFER,IBUFF,DBUFF,MAT1,MAT2,MATANS         MULT    42
     1                ,MTEMP1,MTEMP2,MATNAM,IPRINT)                      MULT    43
C                                                                        MULT    44
      INTEGER YES                                                        MULT    45
C              MATRIX MULTIPLICATION ROUTINE                             MULT    46
C              MAT1 * MAT2 = MATANS                                      MULT    47
C              MTEMP1 AND MTEMP2 ARE SCRATCH TAPES USED ALTERNATELY      MULT    48
C           1. READ IN AS MUCH OF MAT2 AS WILL FIT IN CORE               MULT    49
C           2. READ IN A ROW OF MAT1                                     MULT    50
C           3. ZERO OUT A ROW OF ANSWER OR READ IN PREVIOUS PARTIALS     MULT    51
C           4. COMPUTE A ROW OF ANSWER OR NEW PARTIALS                   MULT    52
C           5. GO TO 2 UNLESS MAT1 IS EXHAUSTED                          MULT    53
C           6. UNLESS MAT2 IS EXHAUSTED, REWIND MAT1 & PARTIALS & GO TO 1 MULT   54
C                                                                        MULT    55
C                                                                        MULT    56
CIBM  BEGINNING OF TYPE STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS MULT    57
C     DOUBLE PRECISION DBUFF                                             MULT    58
```

```
COMMON BLOCKS   LENGTH     MEMBERS - BIAS NAME(LENGTH)
                                 6 IUMPLI (1)              7 IFMPLI (1)              8 IUTPGT (1)
                                 9 IFTPGT (1)             10 IUPATF (1)             11 IFPATF (1)
                                12 IUMPL  (1)             13 IFMPL  (1)             14 IUSLT  (1)
                                15 IFSLT  (1)             16 IUDLT  (1)             17 IFDLT  (1)
                                18 IUQA   (1)             19 IFQA   (1)             20 IUQAT  (1)
                                21 IFQAT  (1)             22 IUPHA  (1)             23 IFPHA  (1)
                                24 IUPHAT (1)             25 IFPHAT (1)
    LOCSTR          6            0 IUSTRI (1)              1 IFSTRI (1)              2 IUMREF (1)
                                 3 IFMREF (1)              4 IUMOD  (1)              5 IFMOD  (1)
    INVERT        125            0 INVERT (1)              1 IUA2   (1)              2 IFLEX  (1)
                                 3 AORD   (30)            33 IPERM  (30)            63 NSTOR  (60)
                               123 IPREV  (1)            124 NDOFT  (1)

STATISTICS
  PROGRAM LENGTH                  511B     329
  CM LABELED COMMON LENGTH        452B     298
         52000B CM USED
```

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STATEMENT LABELS               DEF LINE   REFERENCES
  453   1200                     413        56
  455   1300                     417        57
  457   9999                     421       118      340      346      351      354      356      367      394      407
                                           411      415

COMMON BLOCKS   LENGTH      MEMBERS - BIAS NAME(LENGTH)
    KLUES           24              0 KLUSE   (1)             1 KLUNAL  (1)             2 IRED    (1)
                                    3 KLUMD   (1)             4 KLUBAL  (1)             5 MSADD   (1)
                                    6 NPASS   (1)             7 IDNOPT  (1)             8 VDES    (1)
                                    9 EPS1    (1)            10 DWMAX   (1)            11 NBAR    (1)
                                   12 NFIX    (1)            13 D       (1)            14 DEL     (1)
                                   15 EPS2    (1)            16 NCYC    (1)            17 NNN     (1)
                                   18 IBAND   (1)            19 IFIN    (1)            20 KLUB    (1)
                                   21 KLUQ    (1)            22 MORBAL  (1)            23 DBAL    (1)
    SIZES            6              0 NSTMEM  (1)             1 NSTDOF  (1)             2 NDYDOF  (1)
                                    3 NNOPT   (1)             4 NDESNO  (1)             5 NDESYS  (1)
    PLACES          98              0 IUIN1   (1)             1 IUIN2   (1)             2 IUOUT1  (1)
                                    3 IUOUT2  (1)             4 IUGO1   (1)             5 IUGO2   (1)
                                    6 IUGO3   (1)             7 IUGO4   (1)             8 IUSCR   (1)
                                    9 IFSCR   (1)            10 IFS1    (1)            11 IFS2    (1)
                                   12 IFS3    (1)            13 IFS4    (1)            14 IUCD    (1)
                                   15 IUPR    (1)            16 IUA     (1)            17 IFA     (1)
                                   18 IUY     (1)            19 IFY     (1)            20 IUMEMN  (1)
                                   21 IFMEMN  (1)            22 IUSTFN  (1)            23 IFSTFN  (1)
                                   24 IUKS    (1)            25 IFKS    (1)            26 IUB     (1)
                                   27 IFB     (1)            28 IUDESO  (1)            29 IFDESO  (1)
                                   30 IUMDBI  (1)            31 IFMDBI  (1)            32 IUADDI  (1)
                                   33 IFADDI  (1)            34 IUBALI  (1)            35 IFBALI  (1)
                                   36 IUDESI  (1)            37 IFDESI  (1)            38 IUWTI   (1)
                                   39 IFWTI   (1)            40 IUMEMO  (1)            41 IFMEMO  (1)
                                   42 IUBT    (1)            43 IFBT    (1)            44 IUDESN  (1)
                                   45 IFDESN  (1)            46 IUMD    (1)            47 IFMD    (1)
                                   48 IUMEMF  (1)            49 IFMEMF  (1)            50 IUSTFO  (1)
                                   51 IFSTFO  (1)            52 IUMDB   (1)            53 IFMDB   (1)
                                   54 IUADD   (1)            55 IFADD   (1)            56 IUBAL   (1)
                                   57 IFBAL   (1)            58 IUDESF  (1)            59 IFDESF  (1)
                                   60 IUWT    (1)            61 IFWT    (1)            62 IUDUM1  (1)
                                   63 IFDUM1  (1)            64 IUDUM2  (1)            65 IFDUM2  (1)
                                   66 IUDUM3  (1)            67 IFDUM3  (1)            68 IUL     (1)
                                   69 IFL     (1)            70 IUYT    (1)            71 IFYT    (1)
                                   72 IUZ     (1)            73 IFZ     (1)            74 IUZR    (1)
                                   75 IFZR    (1)            76 IULR    (1)            77 IFLR    (1)
                                   78 IUBR    (1)            79 IFBR    (1)            80 IUPHTF  (1)
                                   81 IFPHTF  (1)            82 IUMODM  (1)            83 IFMODM  (1)
                                   84 IUMODK  (1)            85 IFMODK  (1)            86 IUPHT   (1)
                                   87 IFPHT   (1)            88 IUQT    (1)            89 IFQT    (1)
                                   90 IUQ     (1)            91 IFQ     (1)            92 IUPH    (1)
                                   93 IFPH    (1)            94 IUINCM  (1)            95 IFINCM  (1)
                                   96 IUINCK  (1)            97 IFINCK  (1)
    CLIST           11              0 KOUNT   (1)             1 KPAGE   (1)             2 LINES   (1)
                                    3 LINEST  (1)             4 KLABEL  (1)             5 KTPAGE  (1)
                                    6 NPAGE   (1)             7 KBPAGE  (1)             8 LINESG  (1)
                                    9 KOUNTH  (1)            10 KOUNTI  (1)
    CSETUP           1              0 IOINC   (1)
    KLUFF            1              0 KFREE   (1)
    PLAYFF          26              0 IUMDFF  (1)             1 IFMDFF  (1)             2 IUDLTI  (1)
```

```
VARIABLES        SN  TYPE            RELOCATION
    2  NDYDOF        INTEGER              SIZES         REFS        7
  500  NEXT          INTEGER                            REFS       97      98      99     100     112     114     115
                                                         165      166     168     169     173     174     178     179
                                                         182      183     185     186     230     231     233     234
                                                         238      239     243     244     247     248     250     251
                                                         298      299     301     302     306     307     311     312
                                                         314      315     317     318  DEFINED     95      98     100
                                                         110      114     135     155     161     166     169     174
                                                         179      183     186     216     220     226     231     234
                                                         239      244     248     251     273     288     294     299
                                                         302      307     312     315     318
   14  NFIX          INTEGER              KLUES         REFS        4
   21  NNN           INTEGER              KLUES         REFS        4
    3  NNOPT         INTEGER              SIZES         REFS        7     124
    6  NPAGE         INTEGER              CLIST         REFS       25
    6  NPASS         INTEGER              KLUES         REFS        4      60
    1  NSTDOF        INTEGER              SIZES         REFS        7
    0  NSTMEM        INTEGER              SIZES         REFS        7
   77  NSTOR         INTEGER     ARRAY    INVERT        REFS       35
   10  VDES          REAL                 KLUES         REFS        4

EXTERNALS              TYPE    ARGS        REFERENCES
       MESAGE                    3                 40       423
       PROGNA                    2                 39

STATEMENT LABELS                 DEF LINE    REFERENCES
   33   10                           59           48
   71   15                          101           96
   74   20                          106           89
  104   25                          115          111
  106   30                          117          104
  107   33                          121           49
  123   35                          132          122
  153   100                         158          152
  160   115                         163          156      158
  172   120                         176          163      172
  177   140                         181          176
  204   400                         188          124      130
  205   500                         193           60
  232   505                         223          217
  237   507                         228          221      223
  251   510                         241          228      237
  256   515                         246          241
  271   520                         262          253
  274   530                         267          260
    0   550         INACTIVE        270
  321   600                         291          285
  326   615                         296          289      291
  340   620                         309          296      305
  345   640                         313          309
  352   1000                        320          190
  376   1040                        348           50
  401   1060                        353           51
  405   1080                        358           52
  416   1100                        369           53
  437   1125                        395           54
  450   1150                        409           55
```

```
VARIABLES      SN  TYPE            RELOCATION
     6  IUMPLI    INTEGER             PLAYFF       REFS         29   DEFINED      229
     2  IUMREF    INTEGER             LOCSTR       REFS         33        44  DEFINED        42
     2  IUOUT1    INTEGER             PLACES       REFS          8        80      143       276   DEFINED       67       200
     3  IUOUT2    INTEGER             PLACES       REFS          8       133      153       159       164      167       170
                                                    177        181       184      271       286       292      297       300
                                                    303        310       313      316   DEFINED        68      201
    12  IUPATF    INTEGER             PLAYFF       REFS         29   DEFINED      361
   134  IUPH      INTEGER             PLACES       REFS          8   DEFINED      392
    26  IUPHA     INTEGER             PLAYFF       REFS         29   DEFINED      401
    30  IUPHAT    INTEGER             PLAYFF       REFS         29   DEFINED      403
   126  IUPHT     INTEGER             PLACES       REFS          8   DEFINED      385
   120  IUPHTF    INTEGER             PLACES       REFS          8   DEFINED      359       382
    17  IUPR      INTEGER             PLACES       REFS          8
   132  IUQ       INTEGER             PLACES       REFS          8   DEFINED      390
    22  IUQA      INTEGER             PLAYFF       REFS         29   DEFINED      397
    24  IUQAT     INTEGER             PLAYFF       REFS         29   DEFINED      399
   130  IUQT      INTEGER             PLACES       REFS          8   DEFINED      388
    10  IUSCR     INTEGER             PLACES       REFS          8   DEFINED       84       211
    16  IUSLT     INTEGER             PLAYFF       REFS         29   DEFINED      167       300
     4  IUSLTI    INTEGER             PLAYFF       REFS         29   DEFINED       86       232
    26  IUSTFN    INTEGER             PLACES       REFS          8       128      136       274   DEFINED       79       214
    62  IUSTFO    INTEGER             PLACES       REFS          8       128      136       274   DEFINED      125       133
                                                    271
     0  IUSTRI    INTEGER             LOCSTR       REFS         33
    10  IUTPGT    INTEGER             PLAYFF       REFS         29   DEFINED      341
    74  IUWT      INTEGER             PLACES       REFS          8   DEFINED      184       316
    46  IUWTI     INTEGER             PLACES       REFS          8   DEFINED      249
    22  IUY       INTEGER             PLACES       REFS          8   DEFINED       77       209
   106  IUYT      INTEGER             PLACES       REFS          8   DEFINED      323
   110  IUZ       INTEGER             PLACES       REFS          8   DEFINED      325
   112  IUZR      INTEGER             PLACES       REFS          8   DEFINED      327
     0  JUMP      INTEGER             F.P.         REFS         48        49       50        51        52       53        54
                                                     55         56        57  DEFINED         1
     7  KBPAGE    INTEGER             CLIST        REFS         25
     0  KFREE     INTEGER             KLUFF        REFS         28        96      111       163       228      296       340
     4  KLABEL    INTEGER             CLIST        REFS         25
    24  KLUB      INTEGER             KLUES        REFS          4
     4  KLUBAL    INTEGER             KLUES        REFS          4       176      241       309
     3  KLUMD     INTEGER             KLUES        REFS          4       124      152       217       285
     1  KLUNAL    INTEGER             KLUES        REFS          4
    25  KLUQ      INTEGER             KLUES        REFS          4
     0  KLUSE     INTEGER             KLUES        REFS          4       122
     0  KOUNT     INTEGER             CLIST        REFS         25
    11  KOUNTH    INTEGER             CLIST        REFS         25
    12  KOUNTI    INTEGER             CLIST        REFS         25
     1  KPAGE     INTEGER             CLIST        REFS         25
     5  KTPAGE    INTEGER             CLIST        REFS         25
     2  LINES     INTEGER             CLIST        REFS         25
    10  LINESG    INTEGER             CLIST        REFS         25
     3  LINEST    INTEGER             CLIST        REFS         25
    26  MORBAL    INTEGER             KLUES        REFS          4
     5  MSADD     INTEGER             KLUES        REFS          4       158      223       291
    13  NBAR      INTEGER             KLUES        REFS          4
    20  NCYC      INTEGER             KLUES        REFS          4       354
     4  NDESNO    INTEGER             SIZES        REFS          7
     5  NDESYS    INTEGER             SIZES        REFS          7
   174  NDOFT     INTEGER             INVERT       REFS         35
```

```
      SUBROUTINE VIBIFO (ISCR,IROW,NCYC,INDEX1,KLUSE)                   VIBIFO     2
      DIMENSION NAME(2),NAME3(2,2)                                      VIBIFO     3
      DIMENSION Q(2510),QMASS(40,40),QQ(220)                            VIBIFO     4
      DIMENSION TPLUG(3,220),ELAM(220,3)                                VIBIFO     5
      DIMENSION ELMTMD(3,220),EMOM(3,40),RMASS(3,3),CHK(43,43),F(43)    VIBIFO     6
      DIMENSION A(25000)                                                VIBIFO     7
      DIMENSION BUFFER(220)                                             VIBIFO     8
      DIMENSION    TITLE(18,2) ,      TSHV(1)                           VIBIFO     9
      DIMENSION      ITAPES(1)                                          VIBIFO    10
      DIMENSION        IPOS(1)                                          VIBIFO    11
      DIMENSION IFILES(1)                                               VIBIFO    12
      DIMENSION        FREQ(1)                                          VIBIFO    13
      DIMENSION       NAME1(2) ,     NAME2(2)                           VIBIFO    14
C                                                                       VIBIFO    15
C                                                                       VIBIFO    16
C                                                                       VIBIFO    17
      COMMON /CLIST / KOUNT ,KPAGE ,LINES ,LINEST,KLABEL,KTPAGE,NPAGE   VIBIFO    18
     1               ,KBPAGE,LINESG,KOUNTH,KOUNTI                       VIBIFO    19
      COMMON /CTABLE/ KTABLE,NPASS ,NROWS ,NCOLS ,NCOLST,KTABLO,NPAGEA  VIBIFO    20
     1               ,ITAPET                                            VIBIFO    21
      COMMON /CTSHV / LTSHV, TSHV                                       VIBIFO    22
      COMMON /CTAPES/ ITAPES                                            VIBIFO    23
      COMMON /CTITLE/ LTITLE, TITLE                                     VIBIFO    24
      COMMON /FILE  / IPOS                                              VIBIFO    25
      COMMON /CFILES/ KFILES, IFILES                                    VIBIFO    26
      COMMON /FREAKS/ FREQ                                              VIBIFO    27
      COMMON /CPMASS/ A                                                 VIBIFO    28
      COMMON /COMRWP/ ITAPER,ITAPEW,ITAPEP                              VIBIFO    29
      COMMON /REPORT/ KREPOR                                            VIBIFO    30
      COMMON/PLACES/ IUIN1,IUIN2,IUOUT1,IUOUT2,IUGO1,IUGO2,IUGO3,IUGO4, VIBIFO    31
     1               IUSCR,IFSCR,IFS1,IFS2,IFS3,IFS4,IUCD,IUPR,         VIBIFO    32
     2               IUA,IFA,IUY,IFY,IUMEMN,IFMEMN,IUSTFN,IFSTFN,       VIBIFO    33
     3               IUKS,IFKS,IUB,IFB,IUDESO,IFDESO,                   VIBIFO    34
     4               IUMDBI,IFMDBI,IUADDI,IFADDI,IUBALI,IFBALI,         VIBIFO    35
     5               IUDESI,IFDESI,IUWTI,IFWTI,                         VIBIFO    36
     6               IUMEMO,IFMEMO,IUBT,IFBT,                           VIBIFO    37
     7               IUDESN,IFDESN,IUMD,IFMD,                           VIBIFO    38
     8               IUMEMF,IFMEMF,                                     VIBIFO    39
     9               IUSTFO,IFSTFO,IUMDB,IFMDB,IUADD,IFADD,IUBAL,IFBAL, VIBIFO    40
     A               IUDESF,IFDESF,IUWT,IFWT,                           VIBIFO    41
     B               IUDUM1,IFDUM1,IUDUM2,IFDUM2,IUDUM3,IFDUM3,         VIBIFO    42
     C               IUL,IFL,IUYT,IFYT,IUZ,IFZ,IUZR,IFZR,IULR,IFLR,     VIBIFO    43
     D               IUBR,IFBR,                                         VIBIFO    44
     E               IUPHTF,IFPHTF,IUMODM,IFMODM,                       VIBIFO    45
     F               IUMODK,IFMODK,IUPHT,IFPHT,IUQT,IFQT,IUQ,IFQ,       VIBIFO    46
     G               IUPH,IFPH,IUINCM,IFINCM,IUINCK,IFINCK              VIBIFO    47
      COMMON /PLUG/ EMP(3,3), PHP(3,40)                                 VIBIFO    48
      COMMON /PLAYFF/ IUMDFF,IFMDFF,IUDLTI,IFDLTI,IUSLTI,IFSLTI         VIBIFO    49
     1               ,IUMPLI,IFMPLI,IUTPGT,IFTPGT,IUPATF,IFPATF         VIBIFO    50
     2               ,IUMPL,IFMPL,IUSLT,IFSLT,IUDLT,IFDLT               VIBIFO    51
     3               ,IUQA,IFQA,IUQAT,IFQAT,IUPHA,IFPHA,IUPHAT,IFPHAT   VIBIFO    52
      COMMON /KLUFF/ KFREE                                              VIBIFO    53
      COMMON /VKLUE/ NROOTS,NDOFFF,NZERO,IDFV(220),IDFF(220)            VIBIFO    54
      COMMON /CLUEM/ LKLUE,KLUE(80)                                     VIBIFO    55
      COMMON /VIBIFR/ RIGFRQ(3)                                         VIBIFO    56
C                                                                       VIBIFO    57
      EQUIVALENCE (Q(1),TPLUG(1,1)),ELAM(1,1)),CHK(1,1))                VIBIFO    58
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      EQUIVALENCE (Q(1850),ELMTMD(1,1))                                 VIBIFO  59
C                                                                       VIBIFO  60
C                                                                       VIBIFO  61
      DATA NONE   /4HNONE/                                              VIBIFO  62
      DATA NAME3/4HEIGE,4HNNCS,                                         VIBIFO  63
     1           4HEIGE,4HABTF/                                         VIBIFO  64
      DATA NAME1 /4HMODM,4HASS /                                        VIBIFO  65
      DATA NAME2 /4HMODS,4HTIFF/                                        VIBIFO  66
C                                                                       VIBIFO  67
C     FUNCTION DEFINITIONS                                              VIBIFO  68
      MINOF(I,J)   =   MINO(I,J)                                        VIBIFO  69
      MAXOF(I,J)  =  MAXO(I,J)                                          VIBIFO  70
      ABSF(X)    =   ABS(X)                                             VIBIFO  71
C                                                                       VIBIFO  72
C     ROUTINE WHICH WILL PREPARE VIBRATION INFORMATION FOR              VIBIFO  73
C     FLUTTER ANALYSIS MODULE                                           VIBIFO  74
C                                                                       VIBIFO  75
C     INITIAL DATA                                                      VIBIFO  76
C                                                                       VIBIFO  77
      CALL PROGNA (4H(VIB, 4HIFO))                                      VIBIFO  78
      KOLUMN  =    8                                                    VIBIFO  79
      IF  (KREPOR  .EQ.  2)    KOLUMN    =  4                           VIBIFO  80
      NTOTAL = NROOTS                                                   VIBIFO  81
      NRIGID = 0                                                        VIBIFO  82
C                                                                       VIBIFO  83
C MODE SHAPES PHBAR, AS COMPUTED IN THE VIBRATION SOLUTION, WERE STORED VIBIFO  84
C ON AN I/O DEVICE.                                                     VIBIFO  85
C 1. IF CANTILEVER MODES WERE COMPUTED (KFREE=1), PHBAR IS IN ABSOLUTE  VIBIFO  86
C COORDINATES.                                                          VIBIFO  87
C 2. IF FREE-FREE MODES WERE COMPUTED (KFREE=2), PHBAR IS IN RELATIVE   VIBIFO  88
C (TO THE PLUG) COORDINATES.                                            VIBIFO  89
C IN EITHER CASE, READ PHBAR INTO CORE AND NORMALIZE SUCH THAT THE      VIBIFO  90
C LARGEST ABSOLUTE VALUE IN EACH MODE IS UNITY.                         VIBIFO  91
C                                                                       VIBIFO  92
      NFIL  = IPOS(ISCR)                                                VIBIFO  93
      CALL GEDLAB (8HVIBIF001,ISCR,NAME,NFIL,IROWS,JCOLS)               VIBIFO  94
      DO 60 I=1,NROOTS                                                  VIBIFO  95
      IANS5 = 1 + IROW*(I-1)                                            VIBIFO  96
      ILIM  = IANS5 + IROW - 1                                          VIBIFO  97
      CALL GETROW (ISCR,1,BUFFER,IROW)                                  VIBIFO  98
      DO 230 J=IANS5,ILIM                                               VIBIFO  99
      JB      =  J - IANS5 + 1                                          VIBIFO 100
      A(J)    = BUFFER(JB)                                              VIBIFO 101
      IF (J.GT.IANS5) GOTO 82                                           VIBIFO 102
      XLARGE  =  A(IANS5)                                               VIBIFO 103
   82 IF (ABSF(A(J)).GT.ABSF(XLARGE))  XLARGE = A(J)                    VIBIFO 104
  230 CONTINUE                                                          VIBIFO 105
      DO 83 J=IANS5,ILIM                                                VIBIFO 106
   83 A(J)  =  A(J) / XLARGE                                            VIBIFO 107
   60 CONTINUE                                                          VIBIFO 108
      CALL DCLOSE (ISCR)                                                VIBIFO 109
C                                                                       VIBIFO 110
      IF(KFREE.EQ.1) GO TO 5300                                         VIBIFO 111
C                                                                       VIBIFO 112
C    THIS IS A FREE-FREE ANALYSIS. DO THE FOLLOWING                     VIBIFO 113
C   1. COMPUTE PLUG MOTION FOR ALL MODES (PHP)                          VIBIFO 114
C   2. COMPUTE MODE SHAPES IN ABSOLUTE COORDINATES (PHAB)               VIBIFO 115
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      C   3. RENORMALIZE SO THAT LARGEST (ABSOLUTE) VALUE OF EACH ABSOLUTE     VIBIFO    116
      C      MODE SHAPE (IN PHAB OR PHP) IS UNITY. FOR CONSISTENCY, THE        VIBIFO    117
      C      RELATIVE MODE SHAPES PHBAR MUST ALSO BE MODIFIED BY THE SAME      VIBIFO    118
      C      NORMALIZATION FACTORS.                                            VIBIFO    119
      C   4. STORE RELATIVE MODE SHAPES ON I/O UNIT                            VIBIFO    120
      C                                                                        VIBIFO    121
      C PHP=-TPLUG*PHBAR WHERE TRANSFORMATION MATRIX TPLUG WAS GENERATED AND    VIBIFO    122
      C SAVED IN SUBROUTINE FFMASS                                             VIBIFO    123
      C                                                                        VIBIFO    124
            CALL GEDLAB(8HVIBIF002,IUTPGT,NAME,IFTPGT,KROW,KCOL)               VIBIFO    125
            DO 5000 I=1,KROW                                                   VIBIFO    126
            CALL GETROW(IUTPGT,1,TPLUG(1,I),KCOL)                              VIBIFO    127
       5000 CONTINUE                                                           VIBIFO    128
            CALL DCLOSE(IUTPGT)                                                VIBIFO    129
      C                                                                        VIBIFO    130
            NROW=KCOL                                                          VIBIFO    131
            NCOL=KROW                                                          VIBIFO    132
      C                                                                        VIBIFO    133
            DO 5020 I=1,NROW                                                   VIBIFO    134
            DO 5020 K=1,NROOTS                                                 VIBIFO    135
            JO=(K-1)*NCOL                                                      VIBIFO    136
            B=0.0                                                              VIBIFO    137
            DO 5010 J=1,NCOL                                                   VIBIFO    138
            B=B-TPLUG(I,J)*A(JO+J)                                             VIBIFO    139
       5010 CONTINUE                                                           VIBIFO    140
            PHP(I,K)=B                                                         VIBIFO    141
       5020 CONTINUE                                                           VIBIFO    142
      C                                                                        VIBIFO    143
      C READ DYNAMIC LAMBDA MATRIX INTO CORE                                    VIBIFO    144
      C                                                                        VIBIFO    145
            IFDLTI = 5                                                         VIBIFO    146
            IF (KLUSE.LE.0)  IFDLTI = 2                                        VIBIFO    147
            CALL GEDLAB(8HVIBIF003,IUDLTI,NAME,IFDLTI,KROW,KCOL)               VIBIFO    148
            DO 5030 I=1,KROW                                                   VIBIFO    149
            CALL GETROW(IUDLTI,1,ELAM(1,I),KCOL)                               VIBIFO    150
       5030 CONTINUE                                                           VIBIFO    151
            CALL DCLOSE(IUDLTI)                                                VIBIFO    152
      C                                                                        VIBIFO    153
            LROW=KCOL                                                          VIBIFO    154
            LCOL=KROW                                                          VIBIFO    155
      C                                                                        VIBIFO    156
      C PREPARE FOR INCLUSION OF RIGID-BODY MODES IN OUTPUT FOR AFAM AND AFOM  VIBIFO    157
      C                                                                        VIBIFO    158
            IF (KFREE.EQ.1.OR.KLUE(38).EQ.1)  GO TO 5040                       VIBIFO    159
            NRIGID = KROW                                                      VIBIFO    160
            NTOTAL = NROOTS + NRIGID                                           VIBIFO    161
       5040 CONTINUE                                                           VIBIFO    162
      C                                                                        VIBIFO    163
            CALL PUDLAB(8HVIBIF001,IUPHTF,NAME3,IFPHTF,NTOTAL,LROW)            VIBIFO    164
      C                                                                        VIBIFO    165
      C INSERT ZEROES FOR RIGID-BODY MODES IN RELATIVE COORDINATES AND          VIBIFO    166
      C WRITE ON I/O UNIT                                                      VIBIFO    167
      C                                                                        VIBIFO    168
            IF (KFREE.EQ.1.OR.KLUE(38).EQ.1)  GO TO 5046                       VIBIFO    169
            DO 5044 N=1,NRIGID                                                 VIBIFO    170
            DO 5042 I=1,LROW                                                   VIBIFO    171
            BUFFER(I) = 0.0                                                    VIBIFO    172
```

```
 5042 CONTINUE
      CALL PUTROW(IUPHTF,1,BUFFER,LROW)
 5044 CONTINUE
 5046 CONTINUE
C
      DO 5200 K=1,NROOTS
      IO=(K-1)*LROW
C
C TRANSFER KTH RELATIVE FLEXIBLE MODE TO BUFFER
C
      DO 5050 I=1,LROW
      II=IO+I
      BUFFER(I)=A(II)
 5050 CONTINUE
C
C NOW ADD LAMBDA*PHP TO KTH RELATIVE MODE AS STORED IN VARIABLE A.
C RESULT IS KTH ABSOLUTE MODE
C
      DO 5070 I=1,LROW
      B=0.0
      DO 5060 J=1,LCOL
      B=B+ELAM(I,J)*PHP(J,K)
 5060 CONTINUE
      II=IO+I
      A(II)=A(II)+B
 5070 CONTINUE
C
C NOW NORMALIZE KTH MODE SO THAT LARGEST(ABSOLUTE) VALUE OF EACH
C ABSOLUTE MODE (INCLUDING PLUG MOTION) IS UNITY. FOR CONSISTENCY, THE
C KTH RELATIVE MODE SHOULD BE RENORMALIZED.
C
      XMAX=0.0
      DO 5080 I=1,LROW
      II=IO+I
      IF(ABSF(A(II)).GT.ABSF(XMAX)) XMAX=A(II)
 5080 CONTINUE
C
      DO 5090 I=1,LCOL
      IF(ABSF(PHP(I,K)).GT.ABSF(XMAX)) XMAX=PHP(I,K)
 5090 CONTINUE
C
      DO 5100 I=1,LROW
      II=IO+I
      A(II)=A(II)/XMAX
      BUFFER(I)=BUFFER(I)/XMAX
 5100 CONTINUE
C
      DO 5110 I=1,LCOL
      PHP(I,K)=PHP(I,K)/XMAX
 5110 CONTINUE
C
C WRITE KTH RELATIVE MODE ON I/O DEVICE
C
      CALL PUTROW(IUPHTF,1,BUFFER,LROW)
C
 5200 CONTINUE
      CALL DCLOSE(IUPHTF)
```

```
C
C MODIFY OTHER MODAL DATA TO INCLUDE RIGID-BODY MODES IN OUTPUT
C PASSED TO AFAM AND AFOM.
C
      IF (KFREE.EQ.1.OR.KLUE(38).EQ.1)  GO TO 5300
C
C     SHIFT INDICES OF FREQUENCIES AND PLUG MODE SHAPES TO
C     PROVIDE ROOM FOR RIGID-BODY VALUES AT LOWER END OF
C     INDEX NUMBERS.
C
      DO 5210 N=1,NROOTS
      INEW = NTOTAL - N + 1
      IOLD = NROOTS - N + 1
      FREQ(INEW) = FREQ(IOLD)
      DO 5205 L=1,NRIGID
      PHP(L,INEW) = PHP(L,IOLD)
 5205 CONTINUE
 5210 CONTINUE
C
C     READ IN ASSUMED RIGID-BODY FREQUENCIES AND INSERT
C     UNIT VALUES FOR PLUG DISPLACEMENTS IN RIGID-BODY MODES.
C
      IF (NCYC.GT.0)  GO TO 5212
      READ (ITAPER,1001) (FREQ(N),N=1,NRIGID)
      DO 5211 N=1,NRIGID
      IF (FREQ(N).LT.0.002)  FREQ(N) = 0.002
      RIGFRQ(N) = FREQ(N)
 5211 CONTINUE
      GO TO 5214
 5212 CONTINUE
      DO 5213 N=1,NRIGID
      FREQ(N) = RIGFRQ(N)
 5213 CONTINUE
 5214 CONTINUE
      DO 5220 N=1,NRIGID
      DO 5215 K=1,NRIGID
      PHP(K,N) = 0.0
      IF (K.EQ.N)  PHP(K,N) = 1.0
 5215 CONTINUE
 5220 CONTINUE
C
C     SHIFT INDICES OF MODE SHAPES (OTHER THAN PLUG VALUES).
C
      NDOF = KCOL
      NAFLEX = NROOTS*NDOF
      NATOTL = NAFLEX + NRIGID*NDOF
      DO 5230 I=1,NAFLEX
      INEW = NATOTL - I + 1
      IOLD = NAFLEX - I + 1
      A(INEW) = A(IOLD)
 5230 CONTINUE
C
C     INSERT RIGID-BODY MODE SHAPES (OTHER THAN PLUG
C     DISPLACEMENTS) FROM LAMBDA MATRIX.
C
      DO 5240 N=1,NRIGID
      JL = NDOF*(N-1) + 1
```

```
      JU = NDOF*N
      DO 5235 J=JL,JU
      K = J - JL + 1
      A(J) = ELAM(K,N)
 5235 CONTINUE
 5240 CONTINUE
C
      NROOTS = NTOTAL
C
 5300 CONTINUE
C WRITE ABSOLUTE MODE SHAPES ON TAPE
C (PHBAR IF KFREE=1 , PHAB IF KFREE=2)
C
      IUCOM=IUPHTF
      IFCOM=IFPHTF
      IF(KFREE.EQ.1) GO TO 5310
      IUCOM=IUPATF
      IFCOM=IFPATF
 5310 CONTINUE
C
      CALL PUDLAB(8HVIBIF002,IUCOM,NAME3(1,KFREE),IFCOM,NROOTS,IROW)
      DO 320  I=1,NROOTS
      JCL    = IROW*(I - 1) + 1
      JCU    =  I * IROW
      CALL RITVEC(JCL,JCU,BUFFER,IUCOM)
  320 CONTINUE
      CALL DCLOSE(IUCOM)
C
C
C
C LIST ABSOLUTE MODE SHAPES INCLUDING ALL REQUESTED DEGREES OF FREEDOM
C
      IF(KFREE.EQ.1) GO TO 5340
      KOUNT=LINES
      KTOP=0
 5315 CONTINUE
      KBOT=KTOP+1
      KTOP=KTOP+KOLUMN
      IF(KTOP.GT.NROOTS) KTOP=NROOTS
      CALL TITLES(2)
      IF(KOUNT.GT.KOUNTH) GO TO 5320
      WRITE(ITAPEW,4004)
      KOUNT=KOUNT+3
 5320 CONTINUE
      WRITE(ITAPEW,4005) (K,K=KBOT,KTOP)
      CALL PLB (1,1,ITAPEW)
      KOUNT=KOUNT+4
      DO 5325 I=1,LCOL
      WRITE(ITAPEW,2002) I, (PHP(I,K),K=KBOT,KTOP)
      KOUNT=KOUNT+1
 5325 CONTINUE
      IF(KTOP.EQ.NROOTS) GO TO 5330
      LEFT=LINES-KOUNT
      IF(LEFT.LT.7) KOUNT=LINES
      GO TO 5315
C
 5330 CONTINUE
```

```
C
 5340 CONTINUE
C
      KCU    =  0
      JCU    =  0
  400 JCL    =  JCU + 1
      JCU    =  JCU + KOLUMN
      JCU    =  MINOF(JCU,NROOTS)
      INC    =  IROW*(JCU-JCL)
      MIN    =  KCU
      MAX    =  KCU + INC
      KOUNT  =  LINES
      NCOLS  =  3
      DO 500 I=1,IROW
      CALL TITLES (2)
      IF (I .GT. 1 .OR. JCL .GT. 1) GO TO 405
      NROWS  =  1
      KTABLE =  2
      CALL PTABLE (1,52,52
     1   HFREQUENCIES, GENERALIZED MASSES, AND MODE SHAPES FOR)
      NROWS  =  0
      KTABLE =  2
      CALL PTABLE (2,32,32
     1   HALL REQUESTED DEGREES OF FREEDOM)
  405 CONTINUE
      IF(KOUNT.GT.KOUNTH) GO TO 410
      WRITE (ITAPEW,2000)
      CALL PLB (1,1,ITAPEW)
      WRITE (ITAPEW,2001) (J, J=JCL,JCU)
      CALL PLB (1,1,ITAPEW)
      KOUNT = KOUNT + 5
  410 CONTINUE
      KCL    =  I + MIN
      KCU    =  I + MAX
      KOUNT  =  KOUNT + 1
      WRITE (ITAPEW,2002)  I, (A(K), K=KCL,KCU, IROW)
  500 CONTINUE
      IF (JCU .LT. NROOTS) GO TO 400
C
C
C
C READ IN (CANTILEVER) MASS MATIX FROM I/O DEVICE
C
      IPOS(ISCR)=IFMD
      NFIL  = IPOS(ISCR)
      CALL GEDLAB(8HVIBIF004,ISCR,NAME,NFIL,IROWS,JCOLS)
      DO 43  I=1,IROW
      IANS6 = (((I-1)**2 + (I-1))/2) + 1
      ILIM2 = IANS6 + I - 1
      JCOL   =  ILIM2 - IANS6 + 1
      CALL GETROW (ISCR,1,BUFFER,IROW)
      DO 110 K=IANS6,ILIM2
      KB     =  K - IANS6 + 1
  110 A(K)   =  BUFFER(KB)
   43 CONTINUE
      CALL DCLOSE(ISCR)
C
```

```
      C                                                                 VIBIFO  401
      C GENERALIZED MASS                                                VIBIFO  402
      C     FORM PHI(TRANSPOSE) * MASS * PHI                            VIBIFO  403
      C USE ABSOLUTE MODE SHAPES                                        VIBIFO  404
      C                                                                 VIBIFO  405
            DO 45  I=1,NROOTS                                           VIBIFO  406
            CALL GEDLAB(8HVIBIF005,IUCOM,NAME,IFCOM,IROWS,JCOLS)        VIBIFO  407
            DO 46  I1=1,I                                               VIBIFO  408
            CALL GETROW(IUCOM,1,BUFFER,IROW)                            VIBIFO  409
         46 CONTINUE                                                    VIBIFO  410
            DO 47 J=1,IROW                                              VIBIFO  411
            DO 48 K=1,IROW                                              VIBIFO  412
            IF (K.GT.J) GO TO 49                                        VIBIFO  413
            IANS2 = (((J-1)*(J-1) + (J-1))/2) + K                       VIBIFO  414
            GO TO 52                                                    VIBIFO  415
         49 IANS2 = (((K-1)*(K-1) + (K-1))/2) + J                       VIBIFO  416
         52 Q(K) = A(IANS2)                                             VIBIFO  417
         48 CONTINUE                                                    VIBIFO  418
            SUM = 0.E0                                                  VIBIFO  419
            QQ(J) = SCAPRO(Q(1),BUFFER(1),SUM,IROW,1,1)                 VIBIFO  420
         47 CONTINUE                                                    VIBIFO  421
            DO 53 II=1,NROOTS                                           VIBIFO  422
            IF (II.LT.I) GO TO 53                                       VIBIFO  423
            IF (II.EQ.I) GO TO 54                                       VIBIFO  424
            CALL GETROW(IUCOM,1,BUFFER,IROW)                            VIBIFO  425
         54 SUM = 0.E0                                                  VIBIFO  426
            QMASS(II,I) = SCAPRO(QQ(1),BUFFER(1),SUM,IROW,1,1)          VIBIFO  427
            QMASS(I,II) = QMASS(II,I)                                   VIBIFO  428
         53 CONTINUE                                                    VIBIFO  429
            CALL DCLOSE(IUCOM)                                          VIBIFO  430
         45 CONTINUE                                                    VIBIFO  431
      C                                                                 VIBIFO  432
      C IF KFREE=2, INCREMENT THE GENERALIZED MASS TO ACCOUNT FOR THE    VIBIFO  433
      C PRESENCE OF THE PLUG.   PHP(TRAN)*EMP*PHP                        VIBIFO  434
      C                                                                 VIBIFO  435
            IF(KFREE.EQ.1) GO TO 5400                                   VIBIFO  436
      C                                                                 VIBIFO  437
            DO 5370 I=1,NROOTS                                          VIBIFO  438
            DO 5370 L=1,NROOTS                                          VIBIFO  439
            B=0.0                                                       VIBIFO  440
            DO 5360 K=1,LCOL                                            VIBIFO  441
            DO 5360 J=1,LCOL                                            VIBIFO  442
            B=B+PHP(J,I)*EMP(J,K)*PHP(K,L)                              VIBIFO  443
       5360 CONTINUE                                                    VIBIFO  444
            QMASS(I,L)=QMASS(I,L)+B                                     VIBIFO  445
       5370 CONTINUE                                                    VIBIFO  446
      C                                                                 VIBIFO  447
       5400 CONTINUE                                                    VIBIFO  448
      C                                                                 VIBIFO  449
      C                                                                 VIBIFO  450
      C WRITE GENERALIZED MASS MATRIX OUT AS A VECTOR CONTAINING         VIBIFO  451
      C DIAGONAL TERMS ONLY                                             VIBIFO  452
            DO 630 I=1,NROOTS                                           VIBIFO  453
            BUFFER(I)  = QMASS(I,I)                                     VIBIFO  454
        630 CONTINUE                                                    VIBIFO  455
            CALL PUDLAB(8HVIBIF003,IUMODM,NAME1,IFMODM,NROOTS,NROOTS)   VIBIFO  456
```

```
      CALL DCLOSE (IUMODM)
C
C
C FORM GENERALIZED STIFFNESS MATRIX  (DIAGONAL ELEMENTS ONLY)
C
      DO 620 I=1,NROOTS
      BUFFER(I)  = QMASS(I,I) * (FREQ(I)*6.28318)**2
  620 CONTINUE
C
      CALL PUDLAB(8HVIBIF004,IUMODK,NAME2,IFMODK,NROOTS,NROOTS)
      CALL PUTROW (IUMODK, 1, BUFFER(1), NROOTS)
      CALL DCLOSE (IUMODK)
C
C
C
C
C LIST GENERALIZED MASSES
C
      KOUNT=LINES
      JCU    =  0
  600 JCL    =  JCU + 1
      JCU    =  JCU + KOLUMN
      JCU    =  MINOF(JCU,NROOTS)
      LEFT=LINES-KOUNT
      IF(LEFT.LT.15) GO TO 602
      CALL PLB(1,4,ITAPEW)
      WRITE(ITAPEW,3001) (NC,NC=JCL,JCU)
      CALL PLB(1,1,ITAPEW)
      KOUNT=KOUNT+6
      GO TO 605
  602 KOUNT=LINES
  605 CONTINUE
      DO 700 MR=1,NROOTS
      CALL TITLES (2)
      IF(KOUNT.GT.KOUNTH) GO TO 610
      IF(KFREE.EQ.1) WRITE(ITAPEW,3000)
      IF(KFREE.EQ.2) WRITE(ITAPEW,3003)
      WRITE(ITAPEW,3004)
      CALL PLB (1,1,ITAPEW)
      WRITE (ITAPEW,3001) (NC, NC=JCL,JCU)
      CALL PLB(1,1,ITAPEW)
      KOUNT=KOUNT+5
  610 CONTINUE
      KOUNT  =  KOUNT + 1
      WRITE (ITAPEW,3002) MR, (QMASS(MR,NC), NC=JCL,JCU)
  700 CONTINUE
      IF (JCU .LT. NROOTS) GO TO 600
C
C
C IF KFREE=2, DO THE FOLLOWING.
C   A. MOMENTUM CHECK
C      EMOM=LAMBDA(TRAN)*MD*PHI(ABS) + EMP*PHP
C   B. COMPUTE THE GENERALIZED MASS ASSOCIATED WITH THE RIGID BODY MODES
C      RMASS=LAMBDA(TRAN)*MD*LAMBDA + EMP
C
      IF(KFREE.NE.2) GO TO 5800
C
```

```
C CANTILEVER MASS MATRIX MD IS CURRENTLY STORED IN VARIABLE A.         VIBIFO   515
C FIRST, COMPUTE LAMBDA(TRAN)*MD . STORE RESULT IN ELMTMD.              VIBIFO   516
C                                                                      VIBIFO   517
      CALL GEDLAB(8HVIBIF009,IUDLTI,NAME,IFDLTI,KROW,KCOL)             VIBIFO   518
      DO 5405 I=1,KROW                                                 VIBIFO   519
      CALL GETROW(IUDLTI,1,ELAM(1,I),KCOL)                             VIBIFO   520
 5405 CONTINUE                                                         VIBIFO   521
      CALL DCLOSE(IUDLTI)                                              VIBIFO   522
C                                                                      VIBIFO   523
      DO 5420 I=1,LCOL                                                 VIBIFO   524
      DO 5420 K=1,LROW                                                 VIBIFO   525
      B=0.0                                                            VIBIFO   526
      DO 5410 J=1,LROW                                                 VIBIFO   527
      IF(K.LE.J) L=((J-1)*J/2)+K                                       VIBIFO   528
      IF(K.GT.J) L=((K-1)*K/2)+J                                       VIBIFO   529
      B=B+ELAM(J,I)*A(L)                                               VIBIFO   530
 5410 CONTINUE                                                         VIBIFO   531
      ELMTMD(I,K)=B                                                    VIBIFO   532
 5420 CONTINUE                                                         VIBIFO   533
C                                                                      VIBIFO   534
C COMPUTE EMOM                                                         VIBIFO   535
C                                                                      VIBIFO   536
      CALL GEDLAB(8HVIBIF006,IUPATF,NAME,IFPATF,KROW,KCOL)             VIBIFO   537
C                                                                      VIBIFO   538
      DO 5460 K=1,KROW                                                 VIBIFO   539
      CALL GETROW(IUPATF,1,BUFFER,KCOL)                                VIBIFO   540
      DO 5460 I=1,LCOL                                                 VIBIFO   541
      B=0.0                                                            VIBIFO   542
      DO 5440 J=1,LROW                                                 VIBIFO   543
      B=B+ELMTMD(I,J)*BUFFER(J)                                        VIBIFO   544
 5440 CONTINUE                                                         VIBIFO   545
      EMOM(I,K)=B                                                      VIBIFO   546
 5460 CONTINUE                                                         VIBIFO   547
      CALL DCLOSE(IUPATF)                                              VIBIFO   548
C                                                                      VIBIFO   549
      DO 5480 I=1,LCOL                                                 VIBIFO   550
      DO 5480 K=1,NROOTS                                               VIBIFO   551
      B=0.0                                                            VIBIFO   552
      DO 5470 J=1,LCOL                                                 VIBIFO   553
      B=B+EMP(I,J)*PHP(J,K)                                            VIBIFO   554
 5470 CONTINUE                                                         VIBIFO   555
      EMOM(I,K)=EMOM(I,K)+B                                            VIBIFO   556
 5480 CONTINUE                                                         VIBIFO   557
C                                                                      VIBIFO   558
C NOW, COMPUTE RMASS                                                   VIBIFO   559
C                                                                      VIBIFO   560
      DO 5540 I=1,LCOL                                                 VIBIFO   561
      DO 5540 K=1,LCOL                                                 VIBIFO   562
      B=0.0                                                            VIBIFO   563
      DO 5520 J=1,LROW                                                 VIBIFO   564
      B=B+ELMTMD(I,J)*ELAM(J,K)                                        VIBIFO   565
 5520 CONTINUE                                                         VIBIFO   566
      RMASS(I,K)=B+EMP(I,K)                                            VIBIFO   567
 5540 CONTINUE                                                         VIBIFO   568
C                                                                      VIBIFO   569
      LEFT=LINES-KOUNT                                                 VIBIFO   570
      IF(LEFT.LT.14) GO TO 5560                                        VIBIFO   571
```

```
      CALL PLB(1,4,ITAPEW)
      KOUNT=KOUNT+4
      GO TO 5570
 5560 KOUNT=LINES
 5570 CONTINUE
      CALL TITLES(2)
      WRITE(ITAPEW,3005) (J,J=1,LCOL)
      KOUNT=KOUNT+4
      DO 5580 I=1,LCOL
      CALL PLB(1,1,ITAPEW)
      WRITE(ITAPEW,2002) I,(RMASS(I,J),J=1,LCOL)
      KOUNT=KOUNT+2
 5580 CONTINUE
C
C TRANSFER ALL GENERALIZED MASS TERMS (FLEX.+RIGID) TO VARIABLE CHK.
C NORMALIZE SO THAT ALL DIAGONALS ARE UNITY.
C
      DO 5610 I=1,NROOTS
 5610 F(I)=SQRT(1.0/QMASS(I,I))
      IF (KLUE(38).EQ.2)  GO TO 5617
      DO 5615 I=1,LCOL
 5615 F(NROOTS+I)=SQRT(1.0/RMASS(I,I))
 5617 CONTINUE
C
      DO 5620 I=1,NROOTS
      DO 5620 J=1,NROOTS
 5620 CHK(I,J)=QMASS(I,J)*F(I)*F(J)
C
      IF (KLUE(38).EQ.2)  GO TO 5645
      DO 5630 K=1,LCOL
      I=NROOTS+K
      DO 5630 J=1,NROOTS
      CHK(I,J)=EMOM(K,J)*F(I)*F(J)
 5630 CHK(J,I)=CHK(I,J)
C
      DO 5640 K=1,LCOL
      I=NROOTS+K
      DO 5640 L=1,LCOL
      J=NROOTS+L
 5640 CHK(I,J)=RMASS(K,L)*F(I)*F(J)
 5645 CONTINUE
C
C
      KOUNT=LINES
      NSIZ=NROOTS+LCOL
      NFLEX = NTOTAL - NRIGID
      IF (KLUE(38).EQ.2)  NSIZ = NROOTS
      JCU=0
 5700 JCL=JCU+1
      JCU=JCU+KOLUMN
      IF(JCU.GT.NSIZ) JCU=NSIZ
      LEFT=LINES-KOUNT
      IF(LEFT.LT.15) GO TO 5705
      CALL PLB(1,4,ITAPEW)
      WRITE(ITAPEW,3006) (NC,NC=JCL,JCU)
      CALL PLB(1,1,ITAPEW)
      KOUNT=KOUNT+6
```

```
            GO TO 5710                                                   VIBIFO   629
       5705 KOUNT=LINES                                                  VIBIFO   630
       5710 CONTINUE                                                     VIBIFO   631
            DO 5750 I=1,NSIZ                                             VIBIFO   632
            CALL TITLES(2)                                               VIBIFO   633
            IF(KOUNT.GT.KOUNTH) GO TO 5715                               VIBIFO   634
            IF (KLUE(38).EQ.1)  WRITE (ITAPEW,3007) NROOTS,LCOL          VIBIFO   635
            IF (KLUE(38).EQ.2)  WRITE (ITAPEW,3009) LCOL,NFLEX           VIBIFO   636
            CALL PLB(1,1,ITAPEW)                                         VIBIFO   637
            WRITE(ITAPEW,3006) (NC,NC=JCL,JCU)                           VIBIFO   638
            CALL PLB(1,1,ITAPEW)                                         VIBIFO   639
            KOUNT=KOUNT+7                                                VIBIFO   640
       5715 CONTINUE                                                     VIBIFO   641
            WRITE(ITAPEW,3008) I,(CHK(I,J),J=JCL,JCU)                    VIBIFO   642
            KOUNT=KOUNT+1                                                VIBIFO   643
       5750 CONTINUE                                                     VIBIFO   644
            IF(JCU.LT.NSIZ) GO TO 5700                                   VIBIFO   645
      C                                                                  VIBIFO   646
       5800 CONTINUE                                                     VIBIFO   647
            IF (KLUE(4).EQ.1)  STOP                                      VIBIFO   648
      C                                                                  VIBIFO   649
      C                                                                  VIBIFO   650
      C STORE VIBRATION ANALYSIS INFORMATION ON TAPE FOR USE IN FLUTTER   VIBIFO   651
      C ANALYSIS EXCLUDING THE DEGREES OF FREEDOM WHICH HAVE BEEN ELIMINATED VIBIFO   652
      C                                                                  VIBIFO   653
            CALL FSIO (6HIDVIBA,IDVIBA,JDVIBA,KDVIBA,LOCFIL,1)           VIBIFO   654
            ITAPE  =  IDVIBA                                             VIBIFO   655
            IROWR  =  NDOFFF + NZERO                                     VIBIFO   656
            REWIND ITAPE                                                 VIBIFO   657
            WRITE(ITAPE) IROWR,NROOTS                                    VIBIFO   658
            CALL RWBT (ITAPE,FREQ,NROOTS)                                VIBIFO   659
            DO 720 M=1,NROOTS                                            VIBIFO   660
        720 WRITE (ITAPE)  (QMASS(M,I),I=1,NROOTS)                       VIBIFO   661
      C                                                                  VIBIFO   662
      C     READ EIGENVECTORS BACK INTO CORE A MODE AT A TIME            VIBIFO   663
      C (ABSOLUTE MODE SHAPES)                                           VIBIFO   664
      C                                                                  VIBIFO   665
            CALL GEDLAB(8HVIBIF006,IUCOM,NAME,IFCOM,IROWS,JCOLS)         VIBIFO   666
            DO 790  I=1,NROOTS                                           VIBIFO   667
            IANS1 = IROW*(I-1) + 1                                       VIBIFO   668
            ILIM  = I*IROW                                               VIBIFO   669
            CALL GETROW(IUCOM,1,BUFFER,IROW)                             VIBIFO   670
            DO 795 K1=IANS1,ILIM                                         VIBIFO   671
            A(K1)  =  BUFFER(K1 - IANS1 + 1)                             VIBIFO   672
        795 CONTINUE                                                     VIBIFO   673
        790 CONTINUE                                                     VIBIFO   674
            CALL DCLOSE(IUCOM)                                           VIBIFO   675
      C                                                                  VIBIFO   676
      C     READ INDICES WHICH RELATE VIBRATION DOF'S TO FLUTTER DOF'S   VIBIFO   677
      C                                                                  VIBIFO   678
            IF(NCYC.GT.0) GO TO 734                                      VIBIFO   679
            READ (ITAPER,1000) (IDFV(IE),IDFF(IE),IE=1,NDOFFF)           VIBIFO   680
        734 CONTINUE                                                     VIBIFO   681
      C                                                                  VIBIFO   682
            MOVE    =  IROW*NROOTS                                       VIBIFO   683
            NSL     =  MOVE + 1                                          VIBIFO   684
            NSU     =  2*MOVE                                            VIBIFO   685
```

```
      DO 735 NS=NSL,NSU
      NR     =  NS - NSL + 1
      A(NS)  =  A(NR)
  735 A(NR)  =  0.0
      KR     =  NSL - 1
      KS     =  0
      DO 780 M=1,NROOTS
      IR     =  0
      DO 740 II=1,IROWR
  740 BUFFER(II)  = 0.
      DO 760 I=1,IROW
      KR  =  KR + 1
      DO 751 IJ=1,NDOFFF
      IF (IDFV(IJ).EQ.I)  GOTO 752
  751 CONTINUE
      GOTO 760
  752 IR= IDFF(IJ)
      BUFFER(IR)  =  A(KR)
  760 CONTINUE
      CALL RWBT (ITAPE,BUFFER,IROWR)
      DO 770 IS=1,IROWR
      KS     =  KS + 1
  770 A(KS)  =  BUFFER(IS)
  780 CONTINUE
      CALL FCLOSE (IDVIBA,JDVIBA,1)
  800 CONTINUE
C
C
C LIST MODE SHAPES EXCLUDING THE ELIMINATED DEGREES OF FREEDOM
C
      IF (IROW .EQ. IROWR) GO TO 900
      KOUNT=LINES
      KCU    =  0
      JCU    =  0
  820 JCL    =  JCU + 1
      JCU    =  JCU + KOLUMN
      JCU    =  MINOF(JCU,NROOTS)
      INC    =  IROWR*(JCU-JCL)
      MIN    =  KCU
      MAX    =  KCU + INC
      LEFT=LINES-KOUNT
      IF(LEFT.LT.15) GO TO 821
      CALL PLB (1,2,ITAPEW)
      WRITE(ITAPEW,4001) (J,J=JCL,JCU)
      CALL PLB (1,1,ITAPEW)
      KOUNT = KOUNT + 4
      GO TO 822
  821 KOUNT=LINES
  822 CONTINUE
      DO 850 I=1,IROWR
      CALL TITLES (2)
      IF (I .GT. 1 .OR. JCL .GT. 1) GO TO 825
      NROWS  =  1
      KTABLE =  2
      CALL PTABLE (2,42,42
     1   HMODE SHAPES FOR REDUCED DEGREES OF FREEDOM)
  825 CONTINUE
```

```
      IF(KOUNT.GT.KOUNTH) GO TO 840
      WRITE (ITAPEW,4000)
      CALL PLB (1,1,ITAPEW)
      WRITE (ITAPEW,4001) (J, J=JCL,JCU)
      CALL PLB (1,1,ITAPEW)
      KOUNT = KOUNT + 4
  840 CONTINUE
      KCL    =  I + MIN
      KCU    =  I + MAX
      KOUNT  =  KOUNT + 1
      DO 842 IJ=1,NDOFFF
      IJF    =  IJ
      IF (IDFF(IJ) .EQ. I) GO TO 844
  842 CONTINUE
      IJF    =  0
  844 IF (IJF .EQ. 0) GO TO 846
      WRITE(ITAPEW,4002) I, IDFV(IJF), (A(K),K=KCL,KCU,IROWR)
      GO TO 850
  846 WRITE(ITAPEW,4003) I, NONE     , (A(K),K=KCL,KCU,IROWR)
  850 CONTINUE
      IF (JCU .LT. NROOTS) GO TO 820
  900 CONTINUE
C
C RESET NROOTS FOR NEXT PASS
C
      NROOTS = NTOTAL - NRIGID
C
C FORMATS
 1000 FORMAT (10I4)
 1001 FORMAT (3E10.3)
 2000 FORMAT (10X,87HNORMALIZED EIGENVECTORS FOR ALL VIBRATION-ANALYSIS
     1DEGREES OF FREEDOM (ABSOLUTE MOTION)/10X
     2,58HRIGID-BODY MODES (IF REQUESTED) FOLLOWED BY FLEXIBLE MODES)
 2001 FORMAT (10X, 1X, 4HIOLD, 3X, 3HM =, 6X,I2, 7(12X,1I2))
 2002 FORMAT (10X, I5, 1P8E14.6)
 3000 FORMAT (10X, 21HGENERALIZED MASS, LBS)
 3001 FORMAT (10X, 4X, 1HM, 3HN =, 9X,I2, 7(12X,1I2))
 3002 FORMAT (10X, I5, 1P8E14.6)
 3003 FORMAT (10X,83HGENERALIZED MASS (LBS) ASSOCIATED WITH RIGID-BODY (
     1IF REQUESTED) AND FLEXIBLE MODES)
 3004 FORMAT(10X,51H(NORMALIZATION/LARGEST VALUE IN EACH MODE IS UNITY))
 3005 FORMAT(10X,50HGENERALIZED MASS (LBS) ASSOCIATED WITH RIGID-BODY ,
     1            5HMODES,
     2     /,10X,46H(NORMALIZATION/PLUG DISPLACEMENTS EQUAL UNITY),
     3    //,10X, 5H MODE,3I14)
 3006 FORMAT(10X, 5H MODE,2X,8I14)
 3007 FORMAT(10X,46H*****ORTHOGONALIZATION AND MOMENTUM CHECK*****,
     1     /,10X,43H(NORMALIZATION/ALL GEN. MASSES EQUAL UNITY),
     2     /,10X,10HTHE FIRST ,I3,   31H ROWS/COLS ARE ASSOCIATED WITH ,
     3            19HTHE FLEXIBLE MODES.,
     4     /,10X, 9HTHE LAST  I2,    31H ROWS/COLS ARE ASSOCIATED WITH ,
     5            21HTHE RIGID-BODY MODES.)
 3008 FORMAT(10X,I5,2X,1P8E14.6)
 3009 FORMAT(10X,46H*****ORTHOGONALIZATION AND MOMENTUM CHECK*****,
     1     /,10X,43H(NORMALIZATION/ALL GEN. MASSES EQUAL UNITY),
     2     /,10X,10HTHE FIRST ,I1,   31H ROWS/COLS ARE ASSOCIATED WITH ,
     3            21H   RIGID-BODY MODES
```

```
      C45700, SUB  COMPAK                                                  COMPAK     2
      C                                                                    COMPAK     3
      C******************************************************************** COMPAK     4
      C                                                                  * COMPAK     5
      C***  SUBROUTINE         ******************************************* COMPAK     6
      C                                                                  * COMPAK     7
      C***  COMPUTER VERSION  ******************************************** COMPAK     8
      C     ----------------                                             * COMPAK     9
      C     IBM .... AS IS                                               * COMPAK    10
      C                                                                  * COMPAK    11
      C     CDC .... AS IS                                               * COMPAK    12
      C                                                                  * COMPAK    13
      C***  OBJECTIVE  *************************************************** COMPAK    14
      C     ---------                                                    * COMPAK    15
      C     READ, AND LIST ON AN OPTIONAL BASIS, THE STIFFNESS OR        * COMPAK    16
      C     FLEXIBILITY MATRIX.                                          * COMPAK    17
      C                                                                    COMPAK    18
      C     FORTRAN PROGRAM TO READ STIFFNESS OR FLEXIBILITY MATRIX      * COMPAK    19
      C                                                                    COMPAK    20
      C                                                                  * COMPAK    21
      C***  INPUT/OUTPUT  ************************************************ COMPAK    22
      C     ------------                                                 * COMPAK    23
      C                                                                  * COMPAK    24
      C***  SUMMARY OF SYMBOLS  ****************************************** COMPAK    25
      C     ------------------                                           * COMPAK    26
      C                                                                  * COMPAK    27
      C***  ERROR MESSAGES  ********************************************** COMPAK    28
      C     --------------                                               * COMPAK    29
      C     NONE.                                                        * COMPAK    30
      C                                                                  * COMPAK    31
      C******************************************************************** COMPAK    32
            SUBROUTINE COMPAK (IROW,IROWD)                                 COMPAK    33
      C                                                                    COMPAK    34
            DIMENSION HEAD(5,5),HOLD(5)                                    COMPAK    35
            DIMENSION ISETUP(45),IPOS(20),ITAPES(50),KLUEV(20)             COMPAK    36
            DIMENSION LCOL(5)             ,LROW(5)                         COMPAK    37
            DIMENSION MATNAM(2)                                            COMPAK    38
            DIMENSION ROW(220),SFMAT(25000)                                COMPAK    39
            DIMENSION TSHV(1)                                              COMPAK    40
      C                                                                    COMPAK    41
            COMMON/PLACES/ IUIN1,IUIN2,IUOUT1,IUOUT2,IUGO1,IUGO2,IUGO3,IUGO4,  COMPAK    42
           1               IUSCR,IFSCR,IFS1,IFS2,IFS3,IFS4,IUCD,IUPR,      COMPAK    43
           2               IUA,IFA,IUY,IFY,IUMEMN,IFMEMN,IUSTFN,IFSTFN,    COMPAK    44
           3               IUKS,IFKS,IUB,IFB,IUDESO,IFDESO,                COMPAK    45
           4               IUMDBI,IFMDBI,IUADDI,IFADDI,IUBALI,IFBALI,      COMPAK    46
           5               IUDESI,IFDESI,IUWTI,IFWTI,                      COMPAK    47
           6               IUMEMO,IFMEMO,IUBT,IFBT,                        COMPAK    48
           7               IUDESN,IFDESN,IUMD,IFMD,                        COMPAK    49
           8               IUMEMF,IFMEMF,                                  COMPAK    50
           9               IUSTFO,IFSTFO,IUMDB,IFMDB,IUADD,IFADD,IUBAL,IFBAL,  COMPAK    51
           A               IUDESF,IFDESF,IUWT,IFWT,                        COMPAK    52
           B               IUDUM1,IFDUM1,IUDUM2,IFDUM2,IUDUM3,IFDUM3,      COMPAK    53
           C               IUL,IFL,IUYT,IFYT,IUZ,IFZ,IUZR,IFZR,IULR,IFLR,  COMPAK    54
           D               IUBR,IFBR,                                      COMPAK    55
           E               IUPHTF,IFPHTF,IUMODM,IFMODM,                    COMPAK    56
           F               IUMODK,IFMODK,IUPHT,IFPHT,IUQT,IFQT,IUQ,IFQ,    COMPAK    57
           G               IUPH,IFPH,IUINCM,IFINCM,IUINCK,IFINCK           COMPAK    58
```

```
COMMON BLOCKS    LENGTH      MEMBERS - BIAS NAME(LENGTH)
                                     69 IFL     (1)              70 IUYT    (1)              71 IFYT    (1)
                                     72 IUZ     (1)              73 IFZ     (1)              74 IUZR    (1)
                                     75 IFZR    (1)              76 IULR    (1)              77 IFLR    (1)
                                     78 IUBR    (1)              79 IFBR    (1)              80 IUPHTF  (1)
                                     81 IFPHTF  (1)              82 IUMODM  (1)              83 IFMODM  (1)
                                     84 IUMODK  (1)              85 IFMODK  (1)              86 IUPHT   (1)
                                     87 IFPHT   (1)              88 IUQT    (1)              89 IFQT    (1)
                                     90 IUQ     (1)              91 IFQ     (1)              92 IUPH    (1)
                                     93 IFPH    (1)              94 IUINCM  (1)              95 IFINCM  (1)
                                     96 IUINCK  (1)              97 IFINCK  (1)
       PLUG          129              0 EMP     (9)               9 PHP     (120)
       PLAYFF         26              0 IUMDFF  (1)               1 IFMDFF  (1)               2 IUDLTI  (1)
                                      3 IFDLTI  (1)               4 IUSLTI  (1)               5 IFSLTI  (1)
                                      6 IUMPLI  (1)               7 IFMPLI  (1)               8 IUTPGT  (1)
                                      9 IFTPGT  (1)              10 IUPATF  (1)              11 IFPATF  (1)
                                     12 IUMPL   (1)              13 IFMPL   (1)              14 IUSLT   (1)
                                     15 IFSLT   (1)              16 IUDLT   (1)              17 IFDLT   (1)
                                     18 IUQA    (1)              19 IFQA    (1)              20 IUQAT   (1)
                                     21 IFQAT   (1)              22 IUPHA   (1)              23 IFPHA   (1)
                                     24 IUPHAT  (1)              25 IFPHAT  (1)
       KLUFF           1              0 KFREE   (1)
       VKLUE         443              0 NROOTS  (1)               1 NDOFFF  (1)               2 NZERO   (1)
                                      3 IDFV    (220)           223 IDFF    (220)
       CLUEM          81              0 LKLUE   (1)               1 KLUE    (80)
       VIBIFR          3              0 RIGFRQ  (3)

EQUIV CLASSES    LENGTH      MEMBERS - BIAS NAME(LENGTH)
       Q            2510              0 TPLUG   (660)             0 ELAM    (660)             0 CHK     (1849)
                                   1849 ELMTMD  (660)

STATISTICS
  PROGRAM LENGTH                 15001B     6657
  CM LABELED COMMON LENGTH       62370B    25848
         52000B CM USED
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```
LOOPS  LABEL    INDEX     FROM-TO     LENGTH    PROPERTIES
 2010           I         660 660        11B              EXT REFS
 2027   790     I         666 673        21B              EXT REFS  NOT INNER
 2042   795     K1        670 672         3B     INSTACK
 2057           IE        679 679        10B              EXT REFS
 2100   735     NS        685 688         4B     INSTACK
 2110   780     M         691 708        43B              EXT REFS  NOT INNER
 2114   740     II        693 694         2B     INSTACK
 2120   760     I         695 703        17B              NOT INNER
 2122   751     IJ        697 699         5B     INSTACK    EXITS
 2144   770     IS        705 707         3B     INSTACK
 2202           J         728 728         4B              EXT REFS
 2216   850     I         734 761       110B              EXT REFS  NOT INNER
 2241           J         745 745         4B              EXT REFS
 2260   842     IJ        752 755         6B     INSTACK    EXITS
 2276           K         758 758         7B              EXT REFS
 2313           K         760 760         7B              EXT REFS

COMMON BLOCKS   LENGTH     MEMBERS - BIAS NAME(LENGTH)
       CLIST        11                0 KOUNT  (1)               1 KPAGE  (1)               2 LINES  (1)
                                      3 LINEST (1)               4 KLABEL (1)               5 KTPAGE (1)
                                      6 NPAGE  (1)               7 KBPAGE (1)               8 LINESG (1)
                                      9 KOUNTH (1)              10 KOUNTI (1)
       CTABLE        8                0 KTABLE (1)               1 NPASS  (1)               2 NROWS  (1)
                                      3 NCOLS  (1)               4 NCOLST (1)               5 KTABLO (1)
                                      6 NPAGEA (1)               7 ITAPET (1)
       CTSHV         2                0 LTSHV  (1)               1 TSHV   (1)
       CTAPES        1                0 ITAPES (1)
       CTITLE       37                0 LTITLE (1)               1 TITLE  (36)
       FILE          1                0 IPOS   (1)
       CFILES        2                0 KFILES (1)               1 IFILES (1)
       FREAKS        1                0 FREQ   (1)
       CPMASS    25000                0 A      (25000)
       COMRWP        3                0 ITAPER (1)               1 ITAPEW (1)               2 ITAPEP (1)
       REPORT        1                0 KREPOR (1)
       PLACES       98                0 IUIN1  (1)               1 IUIN2  (1)               2 IUOUT1 (1)
                                      3 IUOUT2 (1)               4 IUGO1  (1)               5 IUGO2  (1)
                                      6 IUGO3  (1)               7 IUGO4  (1)               8 IUSCR  (1)
                                      9 IFSCR  (1)              10 IFS1   (1)              11 IFS2   (1)
                                     12 IFS3   (1)              13 IFS4   (1)              14 IUCD   (1)
                                     15 IUPR   (1)              16 IUA    (1)              17 IFA    (1)
                                     18 IUY    (1)              19 IFY    (1)              20 IUMEMN (1)
                                     21 IFMEMN (1)              22 IUSTFN (1)              23 IFSTFN (1)
                                     24 IUKS   (1)              25 IFKS   (1)              26 IUB    (1)
                                     27 IFB    (1)              28 IUDESO (1)              29 IFDESO (1)
                                     30 IUMDBI (1)              31 IFMDBI (1)              32 IUADDI (1)
                                     33 IFADDI (1)              34 IUBALI (1)              35 IFBALI (1)
                                     36 IUDESI (1)              37 IFDESI (1)              38 IUWTI  (1)
                                     39 IFWTI  (1)              40 IUMEMO (1)              41 IFMEMO (1)
                                     42 IUBT   (1)              43 IFBT   (1)              44 IUDESN (1)
                                     45 IFDESN (1)              46 IUMD   (1)              47 IFMD   (1)
                                     48 IUMEMF (1)              49 IFMEMF (1)              50 IUSTFO (1)
                                     51 IFSTFO (1)              52 IUMDB  (1)              53 IFMDB  (1)
                                     54 IUADD  (1)              55 IFADD  (1)              56 IUBAL  (1)
                                     57 IFBAL  (1)              58 IUDESF (1)              59 IFDESF (1)
                                     60 IUWT   (1)              61 IFWT   (1)              62 IUDUM1 (1)
                                     63 IFDUM1 (1)              64 IUDUM2 (1)              65 IFDUM2 (1)
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LOOPS	LABEL	INDEX	FROM-TO	LENGTH	PROPERTIES
422	5215	K	264 267	4B	INSTACK
443	5230	I	275 279	5B	INSTACK
452	5240	N	284 291	21B	NOT INNER
464	5235	J	287 290	4B	INSTACK
512	320	I	307 311	10B	EXT REFS
551		K	330 330	4B	EXT REFS
563	5325	I	333 336	22B	EXT REFS NOT INNER
567		K	334 334	11B	EXT REFS
632	500	I	356 379	63B	EXT REFS NOT INNER
661		J	371 371	4B	EXT REFS
702		K	378 378	7B	EXT REFS
725	43	I	389 397	25B	EXT REFS NOT INNER
743	110	K	394 396	4B	INSTACK
756	45	I	405 430	71B	EXT REFS NOT INNER
761	46	I1	407 409	6B	EXT REFS
770	47	J	410 420	30B	EXT REFS NOT INNER
775	48	K	411 417	13B	OPT
1021	53	II	421 428	22B	EXT REFS
1051	5370	I	437 445	37B	NOT INNER
1052	5370	L	438 445	33B	NOT INNER
1054	5360	K	440 443	23B	NOT INNER
1067	5360	J	441 443	4B	INSTACK
1114	630	I	452 454	3B	INSTACK
1131	620	I	462 464	4B	INSTACK
1164		NC	483 483	4B	EXT REFS
1200	700	MR	489 502	57B	EXT REFS NOT INNER
1224		NC	496 496	4B	EXT REFS
1242		NC	501 501	11B	EXT REFS
1266	5405	I	518 520	7B	EXT REFS
1277	5420	I	523 532	40B	NOT INNER
1300	5420	K	524 532	34B	NOT INNER
1311	5410	J	526 530	15B	OPT
1341	5460	K	538 546	26B	EXT REFS NOT INNER
1344	5460	I	540 546	20B	NOT INNER
1352	5440	J	542 544	4B	INSTACK
1371	5480	I	549 556	30B	NOT INNER
1372	5480	K	550 556	24B	NOT INNER
1403	5470	J	552 554	4B	INSTACK
1422	5540	I	560 567	30B	NOT INNER
1423	5540	K	561 567	24B	NOT INNER
1434	5520	J	563 565	4B	INSTACK
1467		J	577 577	4B	EXT REFS
1477	5580	I	579 583	23B	EXT REFS NOT INNER
1504		J	581 581	11B	EXT REFS
1523	5610	I	588 589	10B	EXT REFS
1536	5615	I	591 592	7B	EXT REFS
1546	5620	I	595 597	20B	NOT INNER
1556	5620	J	596 597	4B	INSTACK
1571	5630	K	600 604	24B	NOT INNER
1605	5630	J	602 604	5B	INSTACK
1616	5640	K	606 610	25B	NOT INNER
1632	5640	L	608 610	5B	INSTACK
1672		NC	625 625	4B	EXT REFS
1706	5750	I	631 643	55B	EXT REFS NOT INNER
1730		NC	637 637	4B	EXT REFS
1745		J	641 641	11B	EXT REFS
2005	720	M	659 660	20B	EXT REFS NOT INNER

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STATEMENT LABELS                 DEF LINE   REFERENCES
  545   5320                       329        326
    0   5325                       336        333
  614   5330                       342        337
  614   5340                       344        318
    0   5360                       443        440        441
    0   5370                       445        437        438
 1110   5400                       447        435
    0   5405                       520        518
    0   5410                       530        526
    0   5420                       532        523        524
    0   5440                       544        542
    0   5460                       546        538        540
    0   5470                       554        552
    0   5480                       556        549        550
    0   5520                       565        563
    0   5540                       567        560        561
 1460   5560                       574        570
 1462   5570                       575        573
    0   5580                       583        579
    0   5610                       589        588
    0   5615                       592        591
 1545   5617                       593        590
    0   5620                       597        595        596
    0   5630                       604        600        602
    0   5640                       610        606        608
 1643   5645                       611        599
 1653   5700                       619        644
 1703   5705                       629        623
 1705   5710                       630        628
 1741   5715                       640        633
    0   5750                       643        631
 1766   5800                       646        512

LOOPS   LABEL     INDEX      FROM-TO    LENGTH    PROPERTIES
   23   60        I           94 107      43B               EXT REFS  NOT INNER
   41   230       J           98 104      12B        OPT
   60   83        J          105 106       3B      INSTACK
   76   5000      I          125 127       7B               EXT REFS
  112   5020      I          133 141      30B               NOT INNER
  113   5020      K          134 141      24B               NOT INNER
  125   5010      J          137 139       4B      INSTACK
  151   5030      I          148 150       7B               EXT REFS
  201   5044      N          169 174      13B               EXT REFS  NOT INNER
  204   5042      I          170 172       2B      INSTACK
  215   5200      K          177 227     117B               EXT REFS  NOT INNER
  223   5050      I          182 185       4B      INSTACK
  231   5070      I          190 197      24B               NOT INNER
  242   5060      J          192 194       4B      INSTACK
  262   5080      I          204 207       6B      INSTACK
  277   5090      I          209 211       5B      INSTACK
  312   5100      I          213 217       4B      INSTACK
  324   5110      I          219 221       3B      INSTACK
  342   5210      N          239 246      22B               NOT INNER
  357   5205      L          243 245       2B      INSTACK
  376   5211      N          253 256       5B      INSTACK
  410   5213      N          259 261       3B      INSTACK
  415   5220      N          263 268      15B               NOT INNER
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STATEMENT	LABELS		DEF LINE	REFERENCES		
2252	840		748	742		
0	842		755	752		
2267	844		757	754		
2307	846		760	757		
2323	850		761	734	759	
2330	900		763	715		
3106	1000	FMT	770	679		
3110	1001	FMT	771	252		
3112	2000	FMT	772	369		
3133	2001	FMT	775	371		
3140	2002	FMT	776	334	378	581
3143	3000	FMT	777	492		
3147	3001	FMT	778	483	496	
3153	3002	FMT	779	501		
3156	3003	FMT	780	493		
3171	3004	FMT	782	494		
3200	3005	FMT	783	577		
3217	3006	FMT	787	625	637	
3222	3007	FMT	788	634		
3255	3008	FMT	794	641		
3260	3009	FMT	795	635		
3313	4000	FMT	801	743		
3325	4001	FMT	803	728	745	
3333	4002	FMT	804	758		
3336	4003	FMT	805	760		
3341	4004	FMT	806	327		
3347	4005	FMT	807	330		
0	5000		127	125		
0	5010		139	137		
0	5020		141	133	134	
0	5030		150	148		
172	5040		161	158		
0	5042		172	170		
0	5044		174	169		
214	5046		175	168		
0	5050		185	182		
0	5060		194	192		
0	5070		197	190		
0	5080		207	204		
0	5090		211	209		
0	5100		217	213		
0	5110		221	219		
0	5200		227	177		
0	5205		245	243		
0	5210		246	239		
0	5211		256	253		
405	5212		258	251		
0	5213		261	259		
414	5214		262	257		
0	5215		267	264		
0	5220		268	263		
0	5230		279	275		
0	5235		290	287		
0	5240		291	284		
475	5300		295	110	233	
504	5310		304	301		
527	5315		321	310		

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EXTERNALS         TYPE    ARGS        REFERENCES
       PUTROW                4             173       225       456       467
       RITVEC                4             310
       RWBT                  3             658       704
       SCAPRO     REAL       6             419       426
       SQRT       REAL       1 LIBRARY     589       592
       TITLES                1             325       357       490       576       632       735

INLINE FUNCTIONS  TYPE    ARGS          DEF LINE  REFERENCES
       ABS        REAL       1  INTRIN              2*103     2*206     2*210
       ABSF       REAL       1    SF         70     2*103     2*206     2*210
       MAXOF      INTEGER    2    SF         69
       MINO       INTEGER    0  INTRIN              350       479       721
       MINOF      INTEGER    2    SF         68     350       479       721

STATEMENT LABELS              DEF LINE    REFERENCES
     0  43                       397         389
     0  45                       430         405
     0  46                       409         407
     0  47                       420         410
     0  48                       417         411
  1002  49                       415         412
  1005  52                       416         414
  1040  53                       428         421       422
  1027  54                       425         423
     0  60                       107          94
    46  82                       103         101
     0  83                       106         105
     0  110                      396         394
     0  230                      104          98
     0  320                      311         307
   616  400                      348         380
   647  405                      367         358
   672  410                      374         368
     0  500                      379         356
  1146  600                      477         503
  1175  602                      487         481
  1177  605                      488         486
  1235  610                      499         491
     0  620                      464         462
     0  630                      454         452
     0  700                      502         489
     0  720                      660         659
  2070  734                      680         678
     0  735                      688         685
     0  740                      694         693
     0  751                      699         697
  2130  752                      701         698
  2134  760                      703         695       700
     0  770                      707         705
     0  780                      708         691
     0  790                      673         666
     0  795                      672         670
     0  800          INACTIVE    710
  2161  820                      719         762
  2213  821                      732         726
  2215  822                      733         731
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VARIABLES      SN  TYPE                 RELOCATION
     0  NCYC       INTEGER                  F.P.       REFS      251       678    DEFINED         1
  3421  NDOF       INTEGER                             REFS      273       274        285       286    DEFINED       272
     1  NDOFFF     INTEGER                 VKLUE       REFS       53       655        679       697        752
  3370  NFIL       INTEGER                             REFS       93       388    DEFINED        92        387
  3454  NFLEX      INTEGER                             REFS      635   DEFINED        616
  2651  NONE       INTEGER                             REFS      760   DEFINED         61
     6  NPAGE      INTEGER                 CLIST       REFS       17
     6  NPAGEA     INTEGER                 CTABLE      REFS       19
     1  NPASS      INTEGER                 CTABLE      REFS       19
  3473  NR         INTEGER                             REFS      687       688    DEFINED       686
  3367  NRIGID     INTEGER                             REFS      160       169        243       252        253       259       263
                                                        264      274       284        616       767    DEFINED        81       159
     0  NROOTS     INTEGER                 VKLUE       REFS       53        80         94       134        160       177       239
                                                        241      273       306        307     2*324        337       350       380
                                                        405      421       437        438       452      2*455       456       462
                                                      2*466      467       479        489       503        550       588       592
                                                        595      596       601        602       607        609       615       617
                                                        634      657       658        659       660        666       682       691
                                                        721      762   DEFINED        293       767
  3403  NROW       INTEGER                             REFS      133   DEFINED        130
     2  NROWS      INTEGER                 CTABLE      REFS       19   DEFINED        359       363        737
  3472  NS         INTEGER                             REFS      686       687    DEFINED       685
  3453  NSIZ       INTEGER                             REFS    2*621       631        644   DEFINED        615       617
  3470  NSL        INTEGER                             REFS      685       686        689   DEFINED        683
  3471  NSU        INTEGER                             REFS      685   DEFINED        684
  3366  NTOTAL     INTEGER                             REFS      163       240        293       616        767
                                                    DEFINED       80       160
     2  NZERO      INTEGER                 VKLUE       REFS       53       655
    11  PHP        REAL          ARRAY     PLUG        REFS       47       193      2*210       220        244       334     2*442
                                                        553  DEFINED       140        220       244        265       266
  3502  Q          REAL          ARRAY                 REFS        3        57         58       419    DEFINED       416
 10426  QMASS      REAL          ARRAY                 REFS        3       427        444       453        463       501       589
                                                        597      660   DEFINED        426       427        444
 13526  QQ         REAL          ARRAY                 REFS        3       426    DEFINED       419
     0  RIGFRQ     REAL          ARRAY     VIBIFR      REFS       55       260    DEFINED       255
 14252  RMASS      REAL          ARRAY                 REFS        5       581        592       610    DEFINED       566
  3450  SUM        REAL                                REFS      419       426    DEFINED       418        425
     1  TITLE      REAL          ARRAY     CTITLE      REFS        8        23
  3502  TPLUG      REAL          ARRAY                 REFS        4        57        126       138
     1  TSHV       REAL          ARRAY     CTSHV       REFS        8        21
  3400  XLARGE     REAL                                REFS      103       106    DEFINED       102        103
  3415  XMAX       REAL                                REFS      206       210        215       216        220
                                                    DEFINED      203       206        210
        VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS           TYPE    ARGS       REFERENCES
        DCLOSE                1           108      128       151       228        312       398        429       457       468
                                          521      547       674
        FCLOSE                3           709
        FSIO                  6           653
        GEDLAB                6            93      124       147       388        406        17        536       665
        GETROW                4            97      126       149       393        408       424        519       539       669
        PLB                   3           331      370       372       482        484       495        497       571       580
                                          624      626       636       638        727       729        744       746
        PROGNA                2            77
        PTABLE                3           361      365       739
        PUDLAB                6           163      306       455       466
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VARIABLES      SN   TYPE            RELOCATION
                                                 487       498       500       572       574       578       582       614
                                                 627       629       639       642       716       730       732       747
                                                 751
   11   KOUNTH      INTEGER              CLIST    REFS        17       326       368       491       633       742
   12   KOUNTI      INTEGER              CLIST    REFS        17
    1   KPAGE       INTEGER              CLIST    REFS        17
 3474   KR          INTEGER                       REFS       696       702   DEFINED       689       696
    0   KREPOR      INTEGER              REPORT   REFS        29        79
 3401   KROW        INTEGER                       REFS       124       125       131       147       148       154       159
                                                 517       518       536       538
 3475   KS          INTEGER                       REFS       706       707   DEFINED       690       706
    0   KTABLE      INTEGER              CTABLE   REFS        19   DEFINED       360       364       738
    5   KTABLO      INTEGER              CTABLE   REFS        19
 3432   KTOP        INTEGER                       REFS       322       323       324       330       334       337
                                              DEFINED        320       323       324
    5   KTPAGE      INTEGER              CLIST    REFS        17
 3465   K1          INTEGER                       REFS     2*671   DEFINED       670
 3420   L           INTEGER                       REFS     2*244       442     2*444       529       609       610
                                              DEFINED        243       438       527       528       608
 3411   LCOL        INTEGER                       REFS       192       209       219       333       440       441       523
                                                 540       549       552       560       561       577       579       581
                                                 591       600       606       608       615       634       635
                                              DEFINED        154
 3434   LEFT        INTEGER                       REFS       339       481       570       623       726
                                              DEFINED        338       480       569       622       725
    2   LINES       INTEGER              CLIST    REFS        17       319       338       339       354       475       480
                                                 487       569       574       614       622       629       716       725
                                                 732
   10   LINESG      INTEGER              CLIST    REFS        17
    3   LINEST      INTEGER              CLIST    REFS        17
    0   LKLUE       INTEGER              CLUEM    REFS        54
 3460   LOCFIL    * INTEGER                       REFS       653
 3410   LROW        INTEGER                       REFS       163       170       173       178       182       190       204
                                                 213       225       524       526       542       563
                                              DEFINED        153
    0   LTITLE      INTEGER              CTITLE   REFS        23
    0   LTSHV       INTEGER              CTSHV    REFS        21
 3463   M           INTEGER                       REFS       660   DEFINED       659       691
 3440   MAX         INTEGER                       REFS       376       750   DEFINED       353       724
 3437   MIN         INTEGER                       REFS       375       749   DEFINED       352       723
 3467   MOVE        INTEGER                       REFS       683       684   DEFINED       682
 3452   MR          INTEGER                       REFS     2*501   DEFINED       489
 3412   N           INTEGER                       REFS       240       241       252     2*254     2*255     2*260       265
                                               2*266       285       286       289   DEFINED       169       239       252
                                                 253       259       263       284
 3422   NAFLEX      INTEGER                       REFS       274       275       277   DEFINED       273
10420   NAME        INTEGER    ARRAY              REFS         2        93       124       147       388       406       517
                                                 536       665
14672   NAME1       INTEGER    ARRAY              REFS        13       455   DEFINED        64
14674   NAME2       INTEGER    ARRAY              REFS        13       466   DEFINED        65
10422   NAME3       INTEGER    ARRAY              REFS         2       163       306   DEFINED        62
 3423   NATOTL      INTEGER                       REFS       276   DEFINED       274
 3451   NC          INTEGER                       REFS       483       496       501       625       637
                                              DEFINED        483       496       501       625       637
 3404   NCOL        INTEGER                       REFS       135       137   DEFINED       131
    3   NCOLS       INTEGER              CTABLE   REFS        19   DEFINED       355
    4   NCOLST      INTEGER              CTABLE   REFS        19
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VARIABLES       SN  TYPE             RELOCATION
   106  IUYT        INTEGER               PLACES   REFS       30
   110  IUZ         INTEGER               PLACES   REFS       30
   112  IUZR        INTEGER               PLACES   REFS       30
  3446  I1        * INTEGER                        DEFINED   407
  3376  J           INTEGER                        REFS       99      100      101    2*103    2*106    2*138    2*193
                                                    288      289      371      412    3*413      415      419    2*442
                                                  3*527    2*528      529    2*543    2*553    2*564      577      581
                                                  3*597    3*603    2*604    2*610      641      728      745
                                                 DEFINED      98      105      137      192      287      371      410
                                                    441      526      542      552      563      577      581      596
                                                    602      609      641      728      745
  3377  JB          INTEGER                        REFS      100  DEFINED       99
  3430  JCL         INTEGER                        REFS      310      351      358      371      483      496      501
                                                    625      637      641      722      728      736      745
                                                 DEFINED     308      348      477      619      719
  3444  JCOL      * INTEGER                        DEFINED   392
  3372  JCOLS       INTEGER                        REFS       93      388      406      665
  3431  JCU         INTEGER                        REFS      310      348      349      350      351      371      380
                                                    477      478      479      483      496      501      503      619
                                                    620      621      625      637      641      644      719      720
                                                    721      722      728      745      762  DEFINED      309      347
                                                    349      350      476      478      479      618      620      621
                                                    718      720      721
  3456  JDVIBA      INTEGER                        REFS      653      709
  3424  JL          INTEGER                        REFS      287      288  DEFINED      285
  3406  JO          INTEGER                        REFS      138  DEFINED      135
  3425  JU          INTEGER                        REFS      287  DEFINED      286
  3405  K           INTEGER                        REFS      135      140      178      193    2*210    2*220      265
                                                  2*266      289      330      334      378      395      396      412
                                                    413    3*415      416    2*442    2*527    3*528      531      545
                                                    553    2*555      564    2*566      601      603      607      610
                                                    758      760  DEFINED      134      177      264      288      330
                                                    334      378      394      411      440      524      538      550
                                                    561      600      606      758      760
  3445  KB          INTEGER                        REFS      396  DEFINED      395
  3433  KBOT        INTEGER                        REFS      330      334  DEFINED      322
     7  KBPAGE      INTEGER               CLIST    REFS       17
  3441  KCL         INTEGER                        REFS      378      758      760  DEFINED      375      749
  3402  KCOL        INTEGER                        REFS      124      126      130      147      149      153      272
                                                    517      519      536      539
  3435  KCU         INTEGER                        REFS      352      353      378      723      724      758      760
                                                 DEFINED     346      376      717      750
  3457  KDVIBA    * INTEGER                        REFS      653
     0  KFILES      INTEGER               CFILES   REFS       25
     0  KFREE       INTEGER               KLUFF    REFS       52      110      158      168      233      301      306
                                                    318      435      492      493      512
     4  KLABEL      INTEGER               CLIST    REFS       17
     1  KLUE        INTEGER      ARRAY    CLUEM    REFS       54      158      168      233      590      599      617
                                                    634      635      647
     0  KLUSE       INTEGER               F.P.     REFS      146  DEFINED        1
  3365  KOLUMN      INTEGER                        REFS      323      349      478      620      720
                                                 DEFINED      78       79
     0  KOUNT       INTEGER               CLIST    REFS       17      326      328      332      335      338      368
                                                    373      377      480      485      491      498      500      569
                                                    572      578      582      622      627      633      639      642
                                                    725      730      742      747      751  DEFINED      319      328
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VARIABLES		SN	TYPE	RELOCATION								
52	IUBT		INTEGER	PLACES	REFS	30						
16	IUCD		INTEGER	PLACES	REFS	30						
3426	IUCOM		INTEGER		REFS	306	310	312	406	408	424	429
					665	669	674	DEFINED	299	302		
72	IUDESF		INTEGER	PLACES	REFS	30						
44	IUDESI		INTEGER	PLACES	REFS	30						
54	IUDESN		INTEGER	PLACES	REFS	30						
34	IUDESO		INTEGER	PLACES	REFS	30						
20	IUDLT		INTEGER	PLAYFF	REFS	48						
2	IUDLTI		INTEGER	PLAYFF	REFS	48	147	149	151	517	519	521
76	IUDUM1		INTEGER	PLACES	REFS	30						
100	IUDUM2		INTEGER	PLACES	REFS	30						
102	IUDUM3		INTEGER	PLACES	REFS	30						
4	IUGO1		INTEGER	PLACES	REFS	30						
5	IUGO2		INTEGER	PLACES	REFS	30						
6	IUGO3		INTEGER	PLACES	REFS	30						
7	IUGO4		INTEGER	PLACES	REFS	30						
140	IUINCK		INTEGER	PLACES	REFS	30						
136	IUINCM		INTEGER	PLACES	REFS	30						
0	IUIN1		INTEGER	PLACES	REFS	30						
1	IUIN2		INTEGER	PLACES	REFS	30						
30	IUKS		INTEGER	PLACES	REFS	30						
104	IUL		INTEGER	PLACES	REFS	30						
114	IULR		INTEGER	PLACES	REFS	30						
56	IUMD		INTEGER	PLACES	REFS	30						
64	IUMDB		INTEGER	PLACES	REFS	30						
36	IUMDBI		INTEGER	PLACES	REFS	30						
0	IUMDFF		INTEGER	PLAYFF	REFS	48						
60	IUMEMF		INTEGER	PLACES	REFS	30						
24	IUMEMN		INTEGER	PLACES	REFS	30						
50	IUMEMO		INTEGER	PLACES	REFS	30						
124	IUMODK		INTEGER	PLACES	REFS	30	466	467	468			
122	IUMODM		INTEGER	PLACES	REFS	30	455	456	457			
14	IUMPL		INTEGER	PLAYFF	REFS	48						
6	IUMPLI		INTEGER	PLAYFF	REFS	48						
2	IUOUT1		INTEGER	PLACES	REFS	30						
3	IUOUT2		INTEGER	PLACES	REFS	30						
12	IUPATF		INTEGER	PLAYFF	REFS	48	302	536	539	547		
134	IUPH		INTEGER	PLACES	REFS	30						
26	IUPHA		INTEGER	PLAYFF	REFS	48						
30	IUPHAT		INTEGER	PLAYFF	REFS	48						
126	IUPHT		INTEGER	PLACES	REFS	30						
120	IUPHTF		INTEGER	PLACES	REFS	30	163	173	225	228	299	
17	IUPR		INTEGER	PLACES	REFS	30						
132	IUQ		INTEGER	PLACES	REFS	30						
22	IUQA		INTEGER	PLAYFF	REFS	48						
24	IUQAT		INTEGER	PLAYFF	REFS	48						
130	IUQT		INTEGER	PLACES	REFS	30						
10	IUSCR		INTEGER	PLACES	REFS	30						
16	IUSLT		INTEGER	PLAYFF	REFS	48						
4	IUSLTI		INTEGER	PLAYFF	REFS	48						
26	IUSTFN		INTEGER	PLACES	REFS	30						
62	IUSTFO		INTEGER	PLACES	REFS	30						
10	IUTPGT		INTEGER	PLAYFF	REFS	48	124	126	128			
74	IUWT		INTEGER	PLACES	REFS	30						
46	IUWTI		INTEGER	PLACES	REFS	30						
22	IUV		INTEGER	PLACES	REFS	30						

```
VARIABLES      SN  TYPE             RELOCATION
     5  IFSLTI    INTEGER                PLAYFF       REFS        48
    27  IFSTFN    INTEGER                PLACES       REFS        30
    63  IFSTFO    INTEGER                PLACES       REFS        30
    12  IFS1      INTEGER                PLACES       REFS        30
    13  IFS2      INTEGER                PLACES       REFS        30
    14  IFS3      INTEGER                PLACES       REFS        30
    15  IFS4      INTEGER                PLACES       REFS        30
    11  IFTPGT    INTEGER                PLAYFF       REFS        48       124
    75  IFWT      INTEGER                PLACES       REFS        30
    47  IFWTI     INTEGER                PLACES       REFS        30
    23  IFY       INTEGER                PLACES       REFS        30
   107  IFYT      INTEGER                PLACES       REFS        30
   111  IFZ       INTEGER                PLACES       REFS        30
   113  IFZR      INTEGER                PLACES       REFS        30
  3414  II        INTEGER                             REFS       184     2*196     2*206     2*215       422       423       426
                                                    2*427       694   DEFINED       183       195       205       214       421
                                                      693
  3477  IJ        INTEGER                             REFS       698       701       753       754   DEFINED       697       752
  3501  IJF       INTEGER                             REFS       757       758   DEFINED       753       756
  3375  ILIM      INTEGER                             REFS        98       105       670   DEFINED        96       668
  3443  ILIM2     INTEGER                             REFS       392       394   DEFINED       391
  3436  INC       INTEGER                             REFS       353       724   DEFINED       351       722
     0  INDEX1    INTEGER  *UNUSED      F.P.       DEFINED         1
  3416  INEW      INTEGER                             REFS       242       244       278   DEFINED       240       276
  3413  IO        INTEGER                             REFS       183       195       205       214   DEFINED       178
  3417  IOLD      INTEGER                             REFS       242       244       278   DEFINED       241       277
     0  IPOS      INTEGER  ARRAY        FILE          REFS        10        24        92       387   DEFINED       386
  3476  IR        INTEGER                             REFS       702   DEFINED       692       701
     0  IROW      INTEGER               F.P.          REFS        95        96        97       306       308       309       351
                                                      356       378       389       393       408       410       411       419
                                                      424       426       667       668       669       682       695       715
                                                   DEFINED         1
  3462  IROWR     INTEGER                             REFS       657       693       704       705       715       722       734
                                                      758       760   DEFINED       655
  3371  IROWS     INTEGER                             REFS        93       388       406       665
  3500  IS        INTEGER                             REFS       707   DEFINED       705
     0  ISCR      INTEGER               F P.          REFS        92        93        97       108       386       387       388
                                                      393       398   DEFINED         1
  3461  ITAPE     INTEGER                             REFS       658       704   DEFINED       654  I/O REFS       656       657
                                                      660
     2  ITAPEP    INTEGER                COMRWP       REFS        28
     0  ITAPER    INTEGER                COMRWP       REFS        28  I/O REFS       252       679
     0  ITAPES    INTEGER  ARRAY         CTAPES       REFS         9        22
     7  ITAPET    INTEGER                CTABLE       REFS        19
     1  ITAPEW    INTEGER                COMRWP       REFS        28       331       370       372       482       484       495
                                                      497       571       580       624       626       636       638       727
                                                      729       744       746  I/O REFS       327       330       334       369
                                                      371       378       483       492       493       494       496       501
                                                      577       581       625       634       635       637       641       728
                                                      743       745       758       760
    20  IUA       INTEGER                PLACES       REFS        30
    66  IUADD     INTEGER                PLACES       REFS        30
    40  IUADDI    INTEGER                PLACES       REFS        30
    32  IUB       INTEGER                PLACES       REFS        30
    70  IUBAL     INTEGER                PLACES       REFS        30
    42  IUBALI    INTEGER                PLACES       REFS        30
   116  IUBR      INTEGER                PLACES       REFS        30
```

VARIABLES		SN TYPE		RELOCATION							
					631	660	666	695	734		
3464	IANS1	INTEGER			REFS	670	671	DEFINED	667		
3447	IANS2	INTEGER			REFS	416	DEFINED	413	415		
3374	IANS5	INTEGER			REFS	96	98	99	101	102	105
					DEFINED	95					
3442	IANS6	INTEGER			REFS	391	392	394	395	DEFINED	390
337	IDFF	INTEGER	ARRAY	VKLUE	REFS	53	701	754	DEFINED	679	
3	IDFV	INTEGER	ARRAY	VKLUE	REFS	53	698	758	DEFINED	679	
3455	IDVIBA	INTEGER			REFS	653	654	709			
3466	IE	INTEGER			REFS	2*679	DEFINED	679			
21	IFA	INTEGER		PLACES	REFS	30					
67	IFADD	INTEGER		PLACES	REFS	30					
41	IFADDI	INTEGER		PLACES	REFS	30					
33	IFB	INTEGER		PLACES	REFS	30					
71	IFBAL	INTEGER		PLACES	REFS	30					
43	IFBALI	INTEGER		PLACES	REFS	30					
117	IFBR	INTEGER		PLACES	REFS	30					
53	IFBT	INTEGER		PLACES	REFS	30					
3427	IFCOM	INTEGER			REFS	306	406	665	DEFINED	300	303
73	IFDESF	INTEGER		PLACES	REFS	30					
45	IFDESI	INTEGER		PLACES	REFS	30					
55	IFDESN	INTEGER		PLACES	REFS	30					
35	IFDESO	INTEGER		PLACES	REFS	30					
21	IFDLT	INTEGER		PLAYFF	REFS	48					
3	IFDLTI	INTEGER		PLAYFF	REFS	48	147	517	DEFINED	145	146
77	IFDUM1	INTEGER		PLACES	REFS	30					
101	IFDUM2	INTEGER		PLACES	REFS	30					
103	IFDUM3	INTEGER		PLACES	REFS	30					
1	IFILES	INTEGER	ARRAY	CFILES	REFS	11	25				
141	IFINCK	INTEGER		PLACES	REFS	30					
137	IFINCM	INTEGER		PLACES	REFS	30					
31	IFKS	INTEGER		PLACES	REFS	30					
105	IFL	INTEGER		PLACES	REFS	30					
115	IFLR	INTEGER		PLACES	REFS	30					
57	IFMD	INTEGER		PLACES	REFS	30	386				
65	IFMDB	INTEGER		PLACES	REFS	30					
37	IFMDBI	INTEGER		PLACES	REFS	30					
1	IFMDFF	INTEGER		PLAYFF	REFS	48					
61	IFMEMF	INTEGER		PLACES	REFS	30					
25	IFMEMN	INTEGER		PLACES	REFS	30					
51	IFMEMO	INTEGER		PLACES	REFS	30					
125	IFMODK	INTEGER		PLACES	REFS	30	466				
123	IFMODM	INTEGER		PLACES	REFS	30	455				
15	IFMPL	INTEGER		PLAYFF	REFS	48					
7	IFMPLI	INTEGER		PLAYFF	REFS	48					
13	IFPATF	INTEGER		PLAYFF	REFS	48	303	536			
135	IFPH	INTEGER		PLACES	REFS	30					
27	IFPHA	INTEGER		PLAYFF	REFS	48					
3[illegible]	IFPHAT	INTEGER		PLAYFF	REFS	48					
127	IFPHT	INTEGER		PLACES	REFS	30					
121	IFPHTF	INTEGER		PLACES	REFS	30	163	300			
133	IFQ	INTEGER		PLACES	REFS	30					
23	IFQA	INTEGER		PLAYFF	REFS	48					
25	IFQAT	INTEGER		PLAYFF	REFS	48					
131	IFQT	INTEGER		PLACES	REFS	30					
11	IFSCR	INTEGER		PLACES	REFS	30					
17	IFSLT	INTEGER		PLAYFF	REFS	48					

```
              4     /,10X, 9HTHE LAST ,I2,    31H ROWS/COLS ARE ASSOCIATED WITH , VIBIFO    800
              5            19HTHE FLEXIBLE MODES.)                                VIBIFO    801
         4000 FORMAT (10X,55HNORMALIZED EIGEN VECTORS FOR REDUCED DEGREES OF FRE VIBIFO    802
             1EDOM,3X,17H(ABSOLUTE MOTION))                                       VIBIFO    803
         4001 FORMAT (10X, 1X,4HINEW, 1X,4HIOLD, 3X, 3HM =, 6X,I2, 7(12X,1I2))   VIBIFO    804
         4002 FORMAT (10X, I5, I5, 1P8E14.6)                                      VIBIFO    805
         4003 FORMAT (10X, I5, A5, 1P8E14.6)                                      VIBIFO    806
         4004 FORMAT(/,10X,   32HMODAL DISPLACEMENTS OF PLUG MASS,/)              VIBIFO    807
         4005 FORMAT (//10X,5H  DOF,8(10X,I4))                                    VIBIFO    808
        C                                                                         VIBIFO    809
              RETURN                                                              VIBIFO    810
              END                                                                 VIBIFO    811
```

SYMBOLIC REFERENCE MAP (R=3)

```
ENTRY POINTS     DEF LINE     REFERENCES
   3  VIBIFO         1          809

VARIABLES       SN  TYPE             RELOCATION
    0  A            REAL       ARRAY    CPMASS      REFS        6       27      102    2*103      106      138      184
                                                     196    2*206      215      278      378      416      529      687
                                                     702      758      760  DEFINED      100      106      196      215
                                                     278      289      396      671      687      688      707
 3407  B            REAL                            REFS      138      140      193      196      442      444      529
                                                     531      543      545      553      555      564      566
                                                 DEFINED      136      138      191      193      439      442      525
                                                     529      541      543      551      553      562      564
14336  BUFFER       REAL       ARRAY                REFS        7       97      100      173      216      225      310
                                                     393      396      408      419      424      426      456      467
                                                     539      543      669      671      704      707
                                                 DEFINED      171      184      216      453      463      694      702
 3502  CHK          REAL       ARRAY                REFS        5       57      604      641  DEFINED      597      603
                                                     604      610
 3502  ELAM         REAL       ARRAY                REFS        4       57      149      193      289      519      529
                                                     564
 7173  ELMTMD       REAL       ARRAY                REFS        5       58      543      564  DEFINED      531
14062  EMOM         REAL       ARRAY                REFS        5      555      603  DEFINED      545      555
    0  EMP          REAL       ARRAY    PLUG        REFS       47      442      553      566
14263  F            REAL       ARRAY                REFS        5    2*597    2*603    2*610  DEFINED      589      592
    0  FREQ         REAL       ARRAY    FREAKS      REFS       12       26      242      254      255      463      658
                                                 DEFINED      242      252      254      260
 3373  I            INTEGER                         REFS       95      126      138      140      149      171      183
                                                     184      193      195      205    2*210      214    2*216    2*220
                                                     276      277      308      309    2*334      358      375      376
                                                     378    2*390      391      407      422      423      426    2*427
                                                     442    2*444    3*453    4*463      519      529      531      543
                                                     545      553    2*555      564    2*566    2*581    3*589    3*592
                                                   3*597    2*603    2*604    2*610    2*641      660      667      668
                                                     698      736      749      750      754      758      760
                                                 DEFINED       94      125      133      148      170      182      190
                                                     204      209      213      219      275      307      333      356
                                                     389      405      437      452      462      518      523      540
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      COMMON/KLUES/ KLUSE,KLUNAL,IRED,KLUMD,KLUBAL,MSADD,NPAS, IDNOPT,   COMPAK    59
     1              VDES,EPS1,DWMAX,NBAR,NFIX,D,DEL,EPS2,NCYC,NNN,IBAND, COMPAK    60
     2              IFIN,KLUB,KLUQ,MORBAL,DBAL                           COMPAK    61
      COMMON /CLIST / KOUNT ,KPAGE ,LINES ,LINEST,KLABEL,KTPAGE,NPAGE    COMPAK    62
     1               ,KBPAGE,LINESG,KOUNTH,KOUNTI                        COMPAK    63
      COMMON /CTABLE/ KTABLE,NPASS ,NROWS, NCOLS , NCOLST,KTABLO,NPAGEA  COMPAK    64
     1               ,ITAPET                                             COMPAK    65
      COMMON /CTSHV / LTSHV ,TSHV                                        COMPAK    66
      COMMON /CLUEV / LKLUEV,KLUEV                                       COMPAK    67
      COMMON /CPMASS/  SFMAT                                             COMPAK    68
      COMMON /CTAPES/ ITAPES                                             COMPAK    69
      COMMON /COMRWP/ ITAPER,ITAPEW,ITAPEP                               COMPAK    70
      COMMON /MATRIX/ ISETUP                                             COMPAK    71
      COMMON /REPORT/ KREPOR                                             COMPAK    72
      COMMON /FILE  / IPOS                                               COMPAK    73
C                                                                        COMPAK    74
C                                                                        COMPAK    75
C FUNCTION DEFINITION                                                    COMPAK    76
C                                                                        COMPAK    77
      MINOF(I1,I2)      =  MINO(I1,I2)                                   COMPAK    78
C                                                                        COMPAK    79
C                                                                        COMPAK    80
C INITIAL CONDITIONS                                                     COMPAK    81
      DATA HOLD/ 4HROW ,4H COL,4H    ,4H   V,4HALUE/                     COMPAK    82
      DO  5 IH=1,5                                                       COMPAK    83
      DO, 5 JH=1,5                                                       COMPAK    84
    5 HEAD(IH,JH) = HOLD(IH)                                             COMPAK    85
      ZERO = 0.0                                                         COMPAK    86
      NMATD  =  (IROWD*(IROWD+1))/2                                      COMPAK    87
      CALL DVALUE (ROW,ZERO,IROWD)                                       COMPAK    88
      CALL DVALUE (SFMAT,ZERO,NMATD)                                     COMPAK    89
      ITAPEW = ITAPES(6)                                                 COMPAK    90
      M      =  0                                                        COMPAK    91
      KMATV   =  1                                                       COMPAK    92
      IF (IRED.EQ.1) KMATV = 2                                           COMPAK    93
      KLISTV=KLUEV(3)                                                    COMPAK    94
      KOUNT  =  LINES                                                    COMPAK    95
      CALL PROGNA (4H(COM, 4HPAK))                                       COMPAK    96
C                                                                        COMPAK    97
      GO TO ( 10, 12), KMATV                                             COMPAK    98
   10 NTAPE  =  IUKS                                                     COMPAK    99
      IFILE  =  IFKS                                                     COMPAK   100
      KOLUMN =  5                                                        COMPAK   101
      IF (KREPOR .EQ. 2) KOLUMN = 3                                      COMPAK   102
      GO TO 14                                                           COMPAK   103
   12 NTAPE  =  IUA                                                      COMPAK   104
      IFILE  =  IFA                                                      COMPAK   105
      KOLUMN =  8                                                        COMPAK   106
      IF (KREPOR .EQ. 2) KOLUMN = 4                                      COMPAK   107
   14 CONTINUE                                                           COMPAK   108
C                                                                        COMPAK   109
C                                                                        COMPAK   110
C READ STIFFNESS OR FLEXIBILITY MATRIX                                   COMPAK   111
      CALL TITLES (2)                                                    COMPAK   112
      IFILE = 1                                                          COMPAK   113
      IPOS(NTAPE) = IFILE                                                COMPAK   114
      CALL GEDLAB (6HCOMPAK,NTAPE,MATNAM,IFILE,IROW,NM)                  COMPAK   115
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```
      DO 100 J=1,IROW                                                 COMPAK   116
      CALL GETROW (NTAPE,1,ROW ,NM)                                   COMPAK   117
      DO 20 L=1,J                                                     COMPAK   118
      M      =  M + 1                                                 COMPAK   119
      SFMAT(M) = ROW(L)                                               COMPAK   120
   20 CONTINUE                                                        COMPAK   121
  100 CONTINUE                                                        COMPAK   122
      CALL DCLOSE (NTAPE)                                             COMPAK   123
C                                                                     COMPAK   124
C                                                                     COMPAK   125
C LIST STIFFNESS OR FLEXIBILITY MATRIX                                COMPAK   126
      IF (KLISTV .EQ. 1) GO TO 195                                    COMPAK   127
      NROWS  =  1                                                     COMPAK   128
      NCOLS  =  3                                                     COMPAK   129
      KTABLE =  2                                                     COMPAK   130
      IF (KMATV .EQ. 2) GO TO 92                                      COMPAK   131
      LOC    =  0                                                     COMPAK   132
      IROWS  =  IROW                                                  COMPAK   133
      DO 90 I=1,IROWS                                                 COMPAK   134
      J      =  0                                                     COMPAK   135
      JCOLS  =  I                                                     COMPAK   136
   52 KOL    =  0                                                     COMPAK   137
   55 LOC    =  LOC + 1                                               COMPAK   138
      J      =  J + 1                                                 COMPAK   139
      IF (J .GE. JCOLS) GO TO 60                                      COMPAK   140
      IF (SFMAT(LOC)) 60, 55, 60                                      COMPAK   141
   60 KOL    =  KOL + 1                                               COMPAK   142
      LROW(KOL) =  I                                                  COMPAK   143
      LCOL(KOL) =  J                                                  COMPAK   144
       ROW(KOL) =  SFMAT(LOC)                                         COMPAK   145
      IF (J .EQ. JCOLS) GO TO 65                                      COMPAK   146
      IF (KOL .LT. KOLUMN) GO TO 55                                   COMPAK   147
   65 JCU    =  KOL                                                   COMPAK   148
      CALL TITLES (2)                                                 COMPAK   149
      CALL PTABLE (2,35,35                                            COMPAK   150
     1   HSTIFFNESS MATRIX IN STRUCTURES GRID)                        COMPAK   151
      IF (KOUNT .GT. KOUNTH .AND. I .EQ. 1) GO TO 68                  COMPAK   152
      IF (KOUNT .GT. KOUNTH) GO TO 70                                 COMPAK   153
   68 CONTINUE                                                        COMPAK   154
      WRITE (ITAPEW,2001)                                             COMPAK   155
      CALL PLB (1,1,ITAPEW)                                           COMPAK   156
      WRITE (ITAPEW,2002)   ((HEAD(IH,JH),IH=1,5),JH=1,KOLUMN)        COMPAK   157
      KOUNT  = KOUNT + 3                                              COMPAK   158
   70 CONTINUE                                                        COMPAK   159
      KOUNT  = KOUNT + 1                                              COMPAK   160
      WRITE (ITAPEW,2003) (LROW(KOL), LCOL(KOL), ROW(KOL), KOL=1,JCU) COMPAK   161
      IF (J .LT. JCOLS) GO TO 52                                      COMPAK   162
   90 CONTINUE                                                        COMPAK   163
      GO TO 195                                                       COMPAK   164
   92 CONTINUE                                                        COMPAK   165
      LOC    =  0                                                     COMPAK   166
      IROWS  =  IROW                                                  COMPAK   167
      DO 190 I=1,IROWS                                                COMPAK   168
      DO 152 J=1,I                                                    COMPAK   169
      LOC    =  LOC + 1                                               COMPAK   170
  152 ROW(J) =  SFMAT(LOC)                                            COMPAK   171
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```
          JCOLS   =  I                                                 COMPAK     173
      155 JCL     =  JCU + 1                                           COMPAK     174
          JCU     =  JCU + KOLUMN                                      COMPAK     175
          JCU     =  MINOF(JCU,JCOLS)                                  COMPAK     176
          CALL TITLES (2)                                              COMPAK     177
          CALL PTABLE (2,35,35                                         COMPAK     178
         1   HFLEXIBILITY MATRIX IN DYNAMICS GRID)                     COMPAK     179
          IF (KOUNT .GT. KOUNTH .AND. I .EQ. 1) GO TO 158              COMPAK     180
          IF (KOUNT .GT. KOUNTH) GO TO 160                             COMPAK     181
      158 CONTINUE                                                     COMPAK     182
          CALL PLB (1,1,ITAPEW)                                        COMPAK     183
          WRITE (ITAPEW,3001)                                          COMPAK     184
          KOUNT   =  KOUNT + 2                                         COMPAK     185
      160 CONTINUE                                                     COMPAK     186
          KOUNT   =  KOUNT + 1                                         COMPAK     187
          WRITE (ITAPEW,3003) I, JCL, (ROW(J), J=JCL,JCU)              COMPAK     188
          IF (JCU .LT. JCOLS) GO TO 155                                COMPAK     189
      190 CONTINUE                                                     COMPAK     190
      195 CONTINUE                                                     COMPAK     191
C                                                                      COMPAK     192
C                                                                      COMPAK     193
C FORMATS                                                              COMPAK     194
 2001 FORMAT (10X, 16HSTIFFNESS MATRIX)                                COMPAK     195
 2002 FORMAT (10X, 5(2X, 5A4))                                         COMPAK     196
 2003 FORMAT (10X, 5(2I5,1P1E12.4))                                    COMPAK     197
 3001 FORMAT (10X, 2X, 3HROW, 2X, 3HCOL, 2X                            COMPAK     198
     1          , 18HFLEXIBILITY MATRIX)                               COMPAK     199
 3003 FORMAT (10X, 2I5, 1P8E14.6)                                      COMPAK     200
C                                                                      COMPAK     201
          RETURN                                                       COMPAK     202
          END                                                          COMPAK     203
```

```
CARD NR. SEVERITY  DETAILS    DIAGNOSIS OF PROBLEM

     97     I                AN IF STATEMENT MAY BE MORE EFFICIENT THAN A 2 OR 3 BRANCH COMPUTED GO TO STATEMENT.


        SYMBOLIC REFERENCE MAP (R=3)

 ENTRY POINTS      DEF LINE      REFERENCES
     3  COMPAK         32         201

 VARIABLES      SN  TYPE             RELOCATION
    15  D           REAL                 KLUES         REFS        58
    27  DBAL        REAL                 KLUES         REFS        58
    16  DEL         REAL                 KLUES         REFS        58
    12  DWMAX       REAL                 KLUES         REFS        58
    11  EPS1        REAL                 KLUES         REFS        58
    17  EPS2        REAL                 KLUES         REFS        58
   456  HEAD        REAL        ARRAY                  REFS        34       156    DEFINED        84
   507  HOLD        REAL        ARRAY                  REFS        34        84    DEFINED        81
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VARIABLES       SN  TYPE            RELOCATION
  451  I          INTEGER                       REFS      135      142      151      168      172      179      187
                                              DEFINED     133      167
   22  IBAND      INTEGER              KLUES      REFS       58
    7  IDNOPT     INTEGER              KLUES      REFS       58
   21  IFA        INTEGER              PLACES     REFS       41      104
   67  IFADD      INTEGER              PLACES     REFS       41
   41  IFADDI     INTEGER              PLACES     REFS       41
   33  IFB        INTEGER              PLACES     REFS       41
   71  IFBAL      INTEGER              PLACES     REFS       41
   43  IFBALI     INTEGER              PLACES     REFS       41
  117  IFBR       INTEGER              PLACES     REFS       41
   53  IFBT       INTEGER              PLACES     REFS       41
   73  IFDESF     INTEGER              PLACES     REFS       41
   45  IFDESI     INTEGER              PLACES     REFS       41
   55  IFDESN     INTEGER              PLACES     REFS       41
   35  IFDESO     INTEGER              PLACES     REFS       41
   77  IFDUM1     INTEGER              PLACES     REFS       41
  101  IFDUM2     INTEGER              PLACES     REFS       41
  103  IFDUM3     INTEGER              PLACES     REFS       41
  442  IFILE      INTEGER                         REFS      113      114  DEFINED       99      104      112
   23  IFIN       INTEGER              KLUES      REFS       58
  141  IFINCK     INTEGER              PLACES     REFS       41
  137  IFINCM     INTEGER              PLACES     REFS       41
   31  IFKS       INTEGER              PLACES     REFS       41       99
  105  IFL        INTEGER              PLACES     REFS       41
  115  IFLR       INTEGER              PLACES     REFS       41
   57  IFMD       INTEGER              PLACES     REFS       41
   65  IFMDB      INTEGER              PLACES     REFS       41
   37  IFMDBI     INTEGER              PLACES     REFS       41
   61  IFMEMF     INTEGER              PLACES     REFS       41
   25  IFMEMN     INTEGER              PLACES     REFS       41
   51  IFMEMO     INTEGER              PLACES     REFS       41
  125  IFMODK     INTEGER              PLACES     REFS       41
  123  IFMODM     INTEGER              PLACES     REFS       41
  135  IFPH       INTEGER              PLACES     REFS       41
  127  IFPHT      INTEGER              PLACES     REFS       41
  121  IFPHTF     INTEGER              PLACES     REFS       41
  133  IFQ        INTEGER              PLACES     REFS       41
  131  IFQT       INTEGER              PLACES     REFS       41
   11  IFSCR      INTEGER              PLACES     REFS       41
   27  IFSTFN     INTEGER              PLACES     REFS       41
   63  IFSTFO     INTEGER              PLACES     REFS       41
   12  IFS1       INTEGER              PLACES     REFS       41
   13  IFS2       INTEGER              PLACES     REFS       41
   14  IFS3       INTEGER              PLACES     REFS       41
   15  IFS4       INTEGER              PLACES     REFS       41
   75  IFWT       INTEGER              PLACES     REFS       41
   47  IFWTI      INTEGER              PLACES     REFS       41
   23  IFY        INTEGER              PLACES     REFS       41
  107  IFYT       INTEGER              PLACES     REFS       41
  111  IFZ        INTEGER              PLACES     REFS       41
  113  IFZR       INTEGER              PLACES     REFS       41
  432  IH         INTEGER                         REFS     2*84      156  DEFINED       82      156
    0  IPOS       INTEGER    ARRAY     FILE       REFS       35       72  DEFINED      113
    2  IRED       INTEGER              KLUES      REFS       58       92
    0  IROW       INTEGER               F.P.      REFS      114      115      132      166  DEFINED       32
    0  IROWD      INTEGER               F.P.      REFS     2*86       87  DEFINED       32
```

```
VARIABLES      SN  TYPE              RELOCATION
  450  IROWS       INTEGER                           REFS       133      167   DEFINED      132      166
    0  ISETUP      INTEGER    ARRAY     MATRIX       REFS        35       70
    2  ITAPEP      INTEGER              COMRWP       REFS        69
    0  ITAPER      INTEGER              COMRWP       REFS        69
    0  ITAPES      INTEGER    ARRAY     CTAPES       REFS        35       68       89
    7  ITAPET      INTEGER              CTABLE       REFS        63
    1  ITAPEW      INTEGER              COMRWP       REFS        69      155      182   DEFINED       89
                                                 I/O REFS       154      156      160      183      187
   20  IUA         INTEGER              PLACES       REFS        41      103
   66  IUADD       INTEGER              PLACES       REFS        41
   40  IUADDI      INTEGER              PLACES       REFS        41
   32  IUB         INTEGER              PLACES       REFS        41
   70  IUBAL       INTEGER              PLACES       REFS        41
   42  IUBALI      INTEGER              PLACES       REFS        41
  116  IUBR        INTEGER              PLACES       REFS        41
   52  IUBT        INTEGER              PLACES       REFS        41
   16  IUCD        INTEGER              PLACES       REFS        41
   72  IUDESF      INTEGER              PLACES       REFS        41
   44  IUDESI      INTEGER              PLACES       REFS        41
   54  IUDESN      INTEGER              PLACES       REFS        41
   34  IUDESO      INTEGER              PLACES       REFS        41
   76  IUDUM1      INTEGER              PLACES       REFS        41
  100  IUDUM2      INTEGER              PLACES       REFS        41
  102  IUDUM3      INTEGER              PLACES       REFS        41
    4  IUGO1       INTEGER              PLACES       REFS        41
    5  IUGO2       INTEGER              PLACES       REFS        41
    6  IUGO3       INTEGER              PLACES       REFS        41
    7  IUGO4       INTEGER              PLACES       REFS        41
  140  IUINCK      INTEGER              PLACES       REFS        41
  136  IUINCM      INTEGER              PLACES       REFS        41
    0  IUIN1       INTEGER              PLACES       REFS        41
    1  IUIN2       INTEGER              PLACES       REFS        41
   30  IUKS        INTEGER              PLACES       REFS        41       98
  104  IUL         INTEGER              PLACES       REFS        41
  114  IULR        INTEGER              PLACES       REFS        41
   56  IUMD        INTEGER              PLACES       REFS        41
   64  IUMDB       INTEGER              PLACES       REFS        41
   36  IUMDBI      INTEGER              PLACES       REFS        41
   60  IUMEMF      INTEGER              PLACES       REFS        41
   24  IUMEMN      INTEGER              PLACES       REFS        41
   50  IUMEMO      INTEGER              PLACES       REFS        41
  124  IUMODK      INTEGER              PLACES       REFS        41
  122  IUMODM      INTEGER              PLACES       REFS        41
    2  IUOUT1      INTEGER              PLACES       REFS        41
    3  IUOUT2      INTEGER              PLACES       REFS        41
  134  IUPH        INTEGER              PLACES       REFS        41
  126  IUPHT       INTEGER              PLACES       REFS        41
  120  IUPHTF      INTEGER              PLACES       REFS        41
   17  IUPR        INTEGER              PLACES       REFS        41
  132  IUQ         INTEGER              PLACES       REFS        41
  130  IUQT        INTEGER              PLACES       REFS        41
   10  IUSCR       INTEGER              PLACES       REFS        41
   26  IUSTFN      INTEGER              PLACES       REFS        41
   62  IUSTFO      INTEGER              PLACES       REFS        41
   74  IUWT        INTEGER              PLACES       REFS        41
   46  IUWTI       INTEGER              PLACES       REFS        41
```

```
VARIABLES       SN  TYPE            RELOCATION
   106  IUYT        INTEGER              PLACES      REFS         41
   110  IUZ         INTEGER              PLACES      REFS         41
   112  IUZR        INTEGER              PLACES      REFS         41
   445  J           INTEGER                          REFS        117       138       139       143       145       161       170
                                                      187    DEFINED       115       134       138       168       187
   455  JCL         INTEGER                          REFS      2*187   DEFINED       173
   452  JCOLS       INTEGER                          REFS        139       145       161       175       188
                                                  DEFINED        135       172
   454  JCU         INTEGER                          REFS        160       173       174       175       187       188
                                                  DEFINED        147       171       174       175
   433  JH          INTEGER                          REFS         84       156   DEFINED        83       156
     7  KBPAGE      INTEGER              CLIST       REFS         61
     4  KLABEL      INTEGER              CLIST       REFS         61
   440  KLISTV      INTEGER                          REFS        126   DEFINED        93
    24  KLUB        INTEGER              KLUES       REFS         58
     4  KLUBAL      INTEGER              KLUES       REFS         58
     1  KLUEV       INTEGER     ARRAY    CLUEV       REFS         35        66        93
     3  KLUMD       INTEGER              KLUES       REFS         58
     1  KLUNAL      INTEGER              KLUES       REFS         58
    25  KLUQ        INTEGER              KLUES       REFS         58
     O  KLUSE       INTEGER              KLUES       REFS         58
   437  KMATV       INTEGER                          REFS         97       130   DEFINED        91        92
   453  KOL         INTEGER                          REFS        141       142       143       144       146       147     3*160
                                                  DEFINED        136       141       160
   443  KOLUMN      INTEGER                          REFS        146       156       174   DEFINED       100       101       105
                                                      106
     O  KOUNT       INTEGER              CLIST       REFS         61       151       152       157       159       179       180
                                                      184        186   DEFINED        94       157       159       184       186
    11  KOUNTH      INTEGER              CLIST       REFS         61       151       152       179       180
    12  KOUNTI      INTEGER              CLIST       REFS         61
     1  KPAGE       INTEGER              CLIST       REFS         61
     O  KREPOR      INTEGER              REPORT      REFS         71       101       106
     O  KTABLE      INTEGER              CTABLE      REFS         63   DEFINED       129
     5  KTABLO      INTEGER              CTABLE      REFS         63
     5  KTPAGE      INTEGER              CLIST       REFS         61
   446  L           INTEGER                          REFS        119   DEFINED       117
   514  LCOL        INTEGER     ARRAY                REFS         36       160   DEFINED       143
     2  LINES       INTEGER              CLIST       REFS         61        94
    10  LINESG      INTEGER              CLIST       REFS         61
     3  LINEST      INTEGER              CLIST       REFS         61
     O  LKLUEV      INTEGER              CLUEV       REFS         66
   447  LOC         INTEGER                          REFS        137       140       144       169       170
                                                  DEFINED        131       137       165       169
   521  LROW        INTEGER     ARRAY                REFS         36       160   DEFINED       142
     O  LTSHV       INTEGER              CTSHV       REFS         65
   436  M           INTEGER                          REFS        118       119   DEFINED        90       118
   526  MATNAM      INTEGER     ARRAY                REFS         37       114
    26  MORBAL      INTEGER              KLUES       REFS         58
     5  MSADD       INTEGER              KLUES       REFS         58
    13  NBAR        INTEGER              KLUES       REFS         58
     3  NCOLS       INTEGER              CTABLE      REFS         63   DEFINED       128
     4  NCOLST      INTEGER              CTABLE      REFS         63
    20  NCYC        INTEGER              KLUES       REFS         58
    14  NFIX        INTEGER              KLUES       REFS         58
   444  NM          INTEGER                          REFS        114       116
   435  NMATD       INTEGER                          REFS         88   DEFINED        86
    21  NNN         INTEGER              KLUES       REFS         58
```

```
VARIABLES      SN  TYPE           RELOCATION
    6  NPAGE       INTEGER              CLIST       REFS       61
    6  NPAGEA      INTEGER              CTABLE      REFS       63
    6  NPAS        INTEGER              KLUES       REFS       58
    1  NPASS       INTEGER              CTABLE      REFS       63
    2  NROWS       INTEGER              CTABLE      REFS       63   DEFINED     127
  441  NTAPE       INTEGER                          REFS      113      114     116     122   DEFINED     98     103
  530  ROW         REAL       ARRAY                 REFS       38       87     116     119       160    187
                                                 DEFINED      144      170
    0  SFMAT       REAL       ARRAY     CPMASS      REFS       38       67      88     140       144    170
                                                 DEFINED      119
    1  TSHV        REAL       ARRAY     CTSHV       REFS       39       65
   10  VDES        REAL                 KLUES       REFS       58
  434  ZERO        REAL                             REFS       87       88  DEFINED      85
       VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS            TYPE    ARGS        REFERENCES
       DCLOSE                  1           122
       DVALUE                  3            87      88
       GEDLAB                  6           114
       GETROW                  4           116
       PLB                     3           155     182
       PROGNA                  2            95
       PTABLE                  3           149     177
       TITLES                  1           111     148     176

INLINE FUNCTIONS     TYPE    ARGS        DEF LINE  REFERENCES
       MINO        INTEGER     0  INTRIN              175
       MINOF       INTEGER     2    SF       77       175

STATEMENT LABELS             DEF LINE    REFERENCES
    0  5                        84          82      83
   54  10                       98          97
   64  12                      103          97
   73  14                      107         102
    0  20                      120         117
  134  52                      136         161
  135  55                      137         140     146
  142  60                      141         139   2*140
  153  65                      147         145
  165  68                      153         151
  201  70                      158         152
    0  90                      162         133
  226  92                      164         130
    0  100                     121         115
    0  152                     170         168
  243  155                     173         188
  260  158                     181         179
  266  160                     185         180
    0  190                     189         167
  303  195                     190         126     163
  404  2001     FMT            194         154
  410  2002     FMT            195         156
  413  2003     FMT            196         160
  416  3001     FMT            197         183
  424  3003     FMT            199         187
```

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LOOPS  LABEL     INDEX      FROM-TO     LENGTH    PROPERTIES
    7  5         IH          82 84         14B               NOT INNER
   15  5         JH          83 84          3B      INSTACK
  103  100       J          115 121        15B               EXT REFS  NOT INNER
  111  20        L          117 120         3B      INSTACK
  132  90        I          133 162        73B               EXT REFS  NOT INNER
  205            KOL        160 160        12B               EXT REFS
  231   190      I          167 189        52B               EXT REFS  NOT INNER
  235   152      J          168 170         3B      INSTACK

COMMON BLOCKS    LENGTH    MEMBERS - BIAS NAME(LENGTH)
       PLACES        98              0 IUIN1   (1)            1 IUIN2   (1)            2 IUOUT1 (1)
                                     3 IUOUT2  (1)            4 IUG01   (1)            5 IUG02  (1)
                                     6 IUG03   (1)            7 IUG04   (1)            8 IUSCR  (1)
                                     9 IFSCR   (1)           10 IFS1    (1)           11 IFS2   (1)
                                    12 IFS3    (1)           13 IFS4    (1)           14 IUCD   (1)
                                    15 IUPR    (1)           16 IUA     (1)           17 IFA    (1)
                                    18 IUY     (1)           19 IFY     (1)           20 IUMEMN (1)
                                    21 IFMEMN  (1)           22 IUSTFN  (1)           23 IFSTFN (1)
                                    24 IUKS    (1)           25 IFKS    (1)           26 IUB    (1)
                                    27 IFB     (1)           28 IUDESO  (1)           29 IFDESO (1)
                                    30 IUMDBI  (1)           31 IFMDBI  (1)           32 IUADDI (1)
                                    33 IFADDI  (1)           34 IUBALI  (1)           35 IFBALI (1)
                                    36 IUDESI  (1)           37 IFDESI  (1)           38 IUWTI  (1)
                                    39 IFWTI   (1)           40 IUMEMO  (1)           41 IFMEMO (1)
                                    42 IUBT    (1)           43 IFBT    (1)           44 IUDESN (1)
                                    45 IFDESN  (1)           46 IUMD    (1)           47 IFMD   (1)
                                    48 IUMEMF  (1)           49 IFMEMF  (1)           50 IUSTFO (1)
                                    51 IFSTFO  (1)           52 IUMDB   (1)           53 IFMDB  (1)
                                    54 IUADD   (1)           55 IFADD   (1)           56 IUBAL  (1)
                                    57 IFBAL   (1)           58 IUDESF  (1)           59 IFDESF (1)
                                    60 IUWT    (1)           61 IFWT    (1)           62 IUDUM1 (1)
                                    63 IFDUM1  (1)           64 IUDUM2  (1)           65 IFDUM2 (1)
                                    66 IUDUM3  (1)           67 IFDUM3  (1)           68 IUL    (1)
                                    69 IFL     (1)           70 IUYT    (1)           71 IFYT   (1)
                                    72 IUZ     (1)           73 IFZ     (1)           74 IUZR   (1)
                                    75 IFZR    (1)           76 IULR    (1)           77 IFLR   (1)
                                    78 IUBR    (1)           79 IFBR    (1)           80 IUPHTF (1)
                                    81 IFPHTF  (1)           82 IUMODM  (1)           83 IFMODM (1)
                                    84 IUMODK  (1)           85 IFMODK  (1)           86 IUPHT  (1)
                                    87 IFPHT   (1)           88 IUQT    (1)           89 IFQT   (1)
                                    90 IUQ     (1)           91 IFQ     (1)           92 IUPH   (1)
                                    93 IFPH    (1)           94 IUINCM  (1)           95 IFINCM (1)
                                    96 IUINCK  (1)           97 IFINCK  (1)
       KLUES         24              0 KLUSE   (1)            1 KLUNAL  (1)            2 IRED   (1)
                                     3 KLUMD   (1)            4 KLUBAL  (1)            5 MSADD  (1)
                                     6 NPAS    (1)            7 IDNOPT  (1)            8 VDES   (1)
                                     9 EPS1    (1)           10 DWMAX   (1)           11 NBAR   (1)
                                    12 NFIX    (1)           13 D       (1)           14 DEL    (1)
                                    15 EPS2    (1)           16 NCYC    (1)           17 NNN    (1)
                                    18 IBAND   (1)           19 IFIN    (1)           20 KLUB   (1)
                                    21 KLUQ    (1)           22 MORBAL  (1)           23 DBAL   (1)
       CLIST         11              0 KOUNT   (1)            1 KPAGE   (1)            2 LINES  (1)
                                     3 LINEST  (1)            4 KLABEL  (1)            5 KTPAGE (1)
                                     6 NPAGE   (1)            7 KBPAGE  (1)            8 LINESG (1)
                                     9 KOUNTH  (1)           10 KOUNTI  (1)
       CTABLE         8              0 KTABLE  (1)            1 NPASS   (1)            2 NROWS  (1)
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```
COMMON BLOCKS   LENGTH     MEMBERS - BIAS NAME(LENGTH)
                                     3 NCOLS  (1)              4 NCOLST (1)              5 KTABLO (1)
                                     6 NPAGEA (1)              7 ITAPET (1)
       CTSHV         2               0 LTSHV  (1)              1 TSHV   (1)
       CLUEV        21               0 LKLUEV (1)              1 KLUEV  (20)
       CPMASS    25000               0 SFMAT  (25000)
       CTAPES       50               0 ITAPES (50)
       COMRWP        3               0 ITAPER (1)              1 ITAPEW (1)              2 ITAPEP (1)
       MATRIX       45               0 ISETUP (45)
       REPORT        1               0 KREPOR (1)
       FILE         20               0 IPOS   (20)

STATISTICS
  PROGRAM LENGTH                1106B     582
  CM LABELED COMMON LENGTH     61303B   25283
        52000B CM USED
```

```
C45700, SUB. EIGEN                                                     EIGEN     2
C                                                                      EIGEN     3
C********************************************************************* EIGEN     4
C                                                                    * EIGEN     5
C***  SUBROUTINE          ******************************************** EIGEN     6
C                                                                    * EIGEN     7
C***  COMPUTER VERSION  ********************************************** EIGEN     8
C     ----------------                                               * EIGEN     9
C     IBM .... INCLUDES DOUBLE PRECISION TYPE STATEMENTS.  COLUMN ONE * EIGEN    10
C              SHOULD BE BLANK.                                      * EIGEN    11
C                                                                    * EIGEN    12
C     CDC .... DOES NOT INCLUDE DOUBLE PRECISION TYPE STATEMENTS.    * EIGEN    13
C              THESE STATEMENTS ARE CONVERTED INTO COMMENTS BY       * EIGEN    14
C              INSERTING THE LETTER C IN COLUMN ONE.                 * EIGEN    15
C                                                                    * EIGEN    16
C***  OBJECTIVE  ***************************************************** EIGEN    17
C     ---------                                                      * EIGEN    18
C                                                                      EIGEN    19
C     SOLVE THE STANDARD EIGEN VALUE PROBLEM FOR FREQUENCIES AND MODE * EIGEN    20
C     SHAPES USING THE FOLLOWING EXPRESSION.                         * EIGEN    21
C                                                                    * EIGEN    22
C     (A) * (Y) = (LAMBDA) * (Y)                                     * EIGEN    23
C                                                                    * EIGEN    24
C     WHERE ....                                                     * EIGEN    25
C         LAMBDA =  1/FREQ**2                                        * EIGEN    26
C         Y      =  (X) * (L TRANSPOSE)                              * EIGEN    27
C         A IS THE STANDARD EIGENVALUE COEFFICIENT MATRIX.           * EIGEN    28
C         Y IS THE TRANSFORMED COORDINATE SYSTEM.                    * EIGEN    29
C         X IS THE PHYSICAL COORDINATE SYSTEM.                       * EIGEN    30
C         L TRANSPOSE IS THE CHOLESKY DECOMPOSITION (L) OF THE MASS  * EIGEN    31
C         OR STIFFNESS MATRIX                                        * EIGEN    32
C                                                                    * EIGEN    33
C     FOR THE STIFFNESS APPROACH                                     * EIGEN    34
C                                                                    * EIGEN    35
C     A     = (INVERSE OF L) * (M) * (INVERSE OF L TRANSPOSE)        * EIGEN    36
C     KSUBS = (L) * ( L TRANSPOSE)                                   * EIGEN    37
C                                                                    * EIGEN    38
C     WHERE .....                                                    * EIGEN    39
C         M IS THE MASS MATRIX.                                      * EIGEN    40
C         KSUBS IS THE STIFFNESS MATRIX                              * EIGEN    41
C                                                                    * EIGEN    42
C     FOR THE FLEXIBILITY APPROACH                                   * EIGEN    43
C                                                                    * EIGEN    44
C     A     = (L TRANSPOSE) * (KSUBF) * (L)                          * EIGEN    45
C     M     = (L) * (L TRANSPOSE)                                    * EIGEN    46
C                                                                    * EIGEN    47
C     WHERE .....                                                    * EIGEN    48
C         M IS THE MASS MATRIX                                       * EIGEN    49
C         KSUBF IS THE FLEXIBILITY MATRIX.                           * EIGEN    50
C                                                                    * EIGEN    51
C     NOTE THAT THE VARIABLE A(I) USED IN THE PROGRAM BELOW IS USED  * EIGEN    52
C     FOR MANY PURPOSES IN ADDITION TO STORING THE EIGENVALUE        * EIGEN    53
C     COEFFICIENT MATRIX.                                            * EIGEN    54
C                                                                    * EIGEN    55
C***  INPUT/OUTPUT  ************************************************** EIGEN    56
C     ------------                                                   * EIGEN    57
C                                                                    * EIGEN    58
```

```
C***  SUMMARY OF SYMBOLS  *********************************************** EIGEN    59
C     ------------------                                               * EIGEN    60
C                                                                        EIGEN    61
C                                                                      * EIGEN    62
C***  ERROR MESSAGES  *************************************************** EIGEN    63
C     --------------                                                   * EIGEN    64
C     NONE.                                                            * EIGEN    65
C                                                                      * EIGEN    66
C*********************************************************************** EIGEN    67
C                                                                        EIGEN    68
      SUBROUTINE EIGEN (IROWD,KMATV,ISCR,IROW,NCYC,INDEX1)               EIGEN    69
C                                                                        EIGEN    70
C                                                                        EIGEN    71
CIBM  BEGINNING OF TYPE STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS EIGEN    72
C     DOUBLE PRECISION SUM                                               EIGEN    73
CIBM  ENDING OF TYPE STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS    EIGEN    74
C                                                                        EIGEN    75
      DIMENSION A(25000),BUFFER(440)                                     EIGEN    76
      DIMENSION FREQ(40)                                                 EIGEN    77
      DIMENSION IPOS(1)            ,IFILES(1)                            EIGEN    78
      DIMENSION JSETUP(1)                                                EIGEN    79
      DIMENSION MATNAM(2)                                                EIGEN    80
      DIMENSION NAME(2)            ,NAME2(2)                             EIGEN    81
     1         ,NAME3(2)           ,NAME4(2)           ,NAME5(2)         EIGEN    82
      DIMENSION Q(1760),QQ(220)                                          EIGEN    83
      DIMENSION TSHV(1)            ,TITLE(18,2)                          EIGEN    84
C                                                                        EIGEN    85
      COMMON /CPMASS/ A                                                  EIGEN    86
      COMMON /COMRWP/ ITAPER,ITAPEW,ITAPEP                               EIGEN    87
      COMMON /DSRN  / JSETUP                                             EIGEN    88
      COMMON /FILE  / IPOS                                               EIGEN    89
      COMMON /REPORT/ KREPOR                                             EIGEN    90
      COMMON /CTSHV / LTSHV ,TSHV                                        EIGEN    91
      COMMON /CLIST / KOUNT ,KPAGE ,LINES ,LINEST,KLABEL,KTPAGE,NPAGE    EIGEN    92
     1               ,KBPAGE,LINESG,KOUNTH,KOUNTI                        EIGEN    93
      COMMON /CTABLE/ KTABLE,NPASS ,NROWS, NCOLS , NCOLST,KTABLO,NPAGEA  EIGEN    94
     1               ,ITAPET                                             EIGEN    95
      COMMON /CFILES/ KFILES,IFILES                                      EIGEN    96
      COMMON /CTITLE/ LTITLE,TITLE                                       EIGEN    97
      COMMON /FREAKS/ FREQ                                               EIGEN    98
      COMMON/PLACES/ IUIN1,IUIN2,IUOUT1,IUOUT2,IUGO1,IUGO2,IUGO3,IUGO4,  EIGEN    99
     1               IUSCR,IFSCR,IFS1,IFS2,IFS3,IFS4,IUCD,IUPR,          EIGEN   100
     2               IUA,IFA,IUY,IFY,IUMEMN,IFMEMN,IUSTFN,IFSTFN,        EIGEN   101
     3               IUKS,IFKS,IUB,IFB,IUDESO,IFDESO,                    EIGEN   102
     4               IUMDBI,IFMDBI,IUADDI,IFADDI,IUBALI,IFBALI,          EIGEN   103
     5               IUDESI,IFDESI IUWTI,IFWTI,                          EIGEN   104
     6               IUMEMO,IFMEMO,IUBT,IFBT,                            EIGEN   105
     7               IUDESN,IFDESN,IUMD,IFMD,                            EIGEN   106
     8               IUMEMF,IFMEMF,                                      EIGEN   107
     9               IUSTFO,IFSTFO,IUMDB,IFMDB,IUADD,IFADD,IUBAL,IFBAL,  EIGEN   108
     A               IUDESF,IFDESF,IUWT,IFWT,                            EIGEN   109
     B               IUDUM1,IFDUM1,IUDUM2,IFDUM2,IUDUM3,IFDUM3,          EIGEN   110
     C               IUL,IFL,IUYT,IFYT,IUZ,IFZ,IUZR,IFZR,IULR,IFLR,      EIGEN   111
     D               IUBR,IFBR,                                          EIGEN   112
     E               IUPHTF,IFPHTF,IUMODM,IFMODM,                        EIGEN   113
     F               IUMODK,IFMODK,IUPHT,IFPHT,IUQT,IFQT,IUQ,IFQ,        EIGEN   114
     G               IUPH,IFPH,IUINCM,IFINCM,IUINCK,IFINCK               EIGEN   115
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      COMMON /PLAYFF/ IUMDFF,IFMDFF,IUDLTI,IFDLTI,IUSLTI,IFSLTI          EIGEN     116
     1                ,IUMPLI,IFMPLI,IUTPGT,IFTPGT,IUPATF,IFPATF         EIGEN     117
     2                ,IUMPL,IFMPL,IUSLT,IFSLT,IUDLT,IFDLT               EIGEN     118
     3                ,IUQA,IFQA,IUQAT,IFQAT,IUPHA,IFPHA,IUPHAT,IFPHAT   EIGEN     119
      COMMON /KLUFF/ KFREE                                               EIGEN     120
      COMMON /VKLUE/ NROOTS,NDOFFF,NZERO,IDFV(220),IDFF(220)             EIGEN     121
C                                                                        EIGEN     122
      EQUIVALENCE (QQ(1),Q(221))                                         EIGEN     123
C                                                                        EIGEN     124
C                                                                        EIGEN     125
C FUNCTION DEFINITION                                                    EIGEN     126
      ABSF(X)       =  ABS(X)                                            EIGEN     127
      SQRTF(X)      =  SQRT(X)                                           EIGEN     128
      MAXOF(I,J)    =  MAXO(I,J)                                         EIGEN     129
      MINOF(I,J)    =  MINO(I,J)                                         EIGEN     130
C                                                                        EIGEN     131
C                                                                        EIGEN     132
C INITIAL CONDITIONS                                                     EIGEN     133
C                                                                        EIGEN     134
      DATA MATNAM /4HMASS,4HSTIF/                                        EIGEN     135
      DATA MASS   /4HMASS/                                               EIGEN     136
      DATA MATR   /4HSTIF/                                               EIGEN     137
      DATA NAME2  /4H    ,4HLMAT/                                        EIGEN     138
      DATA NAME3  /4HEIGE,4HNPCS/                                        EIGEN     139
      DATA NAME4  /4HLTFL,4HEXL /                                        EIGEN     140
      DATA NAME5  /4HEIGE,4HNTCS/                                        EIGEN     141
      ISCR  =  IUMD                                                      EIGEN     142
      IFCOM=IFMD                                                         EIGEN     143
      IF(KFREE.EQ.2) ISCR=IUMDFF                                         EIGEN     144
      IF(KFREE.EQ.2) IFCOM=IFMDFF                                        EIGEN     145
      JSCR  =  IUG03                                                     EIGEN     146
      IF (KMATV .EQ. 1) NAME2(1) = MATR                                  EIGEN     147
      IF (KMATV .EQ. 2) NAME2(1) = MASS                                  EIGEN     148
      INDIC8=-1                                                          EIGEN     149
      L=1                                                                EIGEN     150
      INDEX = (IROW*IROW + IROW)/2 + 1                                   EIGEN     151
      INDEX1=INDEX-1                                                     EIGEN     152
      NAMER = MATNAM(1)                                                  EIGEN     153
      IF (KMATV .EQ. 1) NAMER = MATNAM(2)                                EIGEN     154
      CALL PROGNA (4H(EIG, 4HEN ))                                       EIGEN     155
C                                                                        EIGEN     156
C                                                                        EIGEN     157
C READ DATA FROM CARDS                                                   EIGEN     158
C                                                                        EIGEN     159
      IF(NCYC.GT.O) GO TO 9                                              EIGEN     160
      READ (ITAPER,1000) NROOTS, NDOFFF,NZERO                            EIGEN     161
    9 CONTINUE                                                           EIGEN     162
C                                                                        EIGEN     163
C                                                                        EIGEN     164
C     READ EITHER THE STIFFNESS MATRIX OR THE MASS MATRIX INTO CORE      EIGEN     165
C     DEPENDING ON WHETHER THE PROBLEM BEING SOLVED IS STIFFNESS         EIGEN     166
C     OR FLEXIBILITY                                                     EIGEN     167
C                                                                        EIGEN     168
C                                                                        EIGEN     169
      IF (KMATV.EQ.1) GO TO 11                                           EIGEN     170
C                                                                        EIGEN     171
C     FLEXIBILITY PROBLEM                                                EIGEN     172
```

```
C     READ MASS MATRIX FROM TAPE                                        EIGEN  173
C                                                                       EIGEN  174
      CALL TITLES (2)                                                   EIGEN  175
      IPOS(ISCR)=IFCOM                                                  EIGEN  176
      CALL READMA (ISCR,IROW,BUFFER,NAME)                               EIGEN  177
C                                                                       EIGEN  178
      IPOS(ISCR)=IFCOM+1                                                EIGEN  179
      NIX  =  0                                                         EIGEN  180
      GOTO 13                                                           EIGEN  181
C                                                                       EIGEN  182
C                                                                       EIGEN  183
   11 CONTINUE                                                          EIGEN  184
      IPOS(ISCR)=IFCOM+1                                                EIGEN  185
      NIX = 0                                                           EIGEN  186
C                                                                       EIGEN  187
C     STIFFNESS PROBLEM                                                 EIGEN  188
C                                                                       EIGEN  189
C     READ STIFFNESS MATRIX FROM TAPE                                   EIGEN  190
C                                                                       EIGEN  191
      CALL COMPAK (IROW,IROWD)                                          EIGEN  192
C                                                                       EIGEN  193
C                                                                       EIGEN  194
   13 CONTINUE                                                          EIGEN  195
      CALL PROGNA (4H(EIG, 4HEN ))                                      EIGEN  196
      CALL TITLES (2)                                                   EIGEN  197
C                                                                       EIGEN  198
C                                                                       EIGEN  199
C FORM CHOLESKY DECOMPOSITION (L-MATRIX)                                EIGEN  200
C 1.  USE OF STIFFNESS MATRIX (KMATV=1) REQUIRES THE CHOLESKY           EIGEN  201
C     DECOMPOSITION OF THE STIFFNESS MATRIX WHICH IS STORED IN 'A'.     EIGEN  202
C 2.  USE OF THE FLEXIBILITY MATRIX (KMATV=2) REQUIRES THE CHOLESKY     EIGEN  203
C     DECOMPOSITION OF THE MASS MATRIX WHICH IS STORED IN 'A'.          EIGEN  204
C                                                                       EIGEN  205
      CALL FUTILE (A, IROW, NIX)                                        EIGEN  206
   12 IF (NIX) 2,3,4                                                    EIGEN  207
    2 WRITE(ITAPEW,41) NAMER                                            EIGEN  208
      GOTO 500                                                          EIGEN  209
    4 WRITE(ITAPEW,42)                                                  EIGEN  210
C                                                                       EIGEN  211
C                                                                       EIGEN  212
    3 CONTINUE                                                          EIGEN  213
C                                                                       EIGEN  214
C                                                                       EIGEN  215
      IF (KMATV.EQ.2) GO TO 14                                          EIGEN  216
C                                                                       EIGEN  217
C     STIFFNESS PROBLEM                                                 EIGEN  218
C                                                                       EIGEN  219
C     STORE A MATRIX WHICH IS SPLIT OF STIFFNESS ON TAPE                EIGEN  220
C     THE ELEMENTS OF SPLIT ARE WRITTEN OUT A ROW AT A TIME             EIGEN  221
C                   (ONLY LOWER TRIANGLE ELEMENTS PRESENT)              EIGEN  222
      NFIL  = IPOS(ISCR)                                                EIGEN  223
      CALL PUDLAB (8HEIGEN01 ,ISCR,NAME2,NFIL,IROW,IROW)                EIGEN  224
      JCL    =  1                                                       EIGEN  225
      DO 140 I=1,IROW                                                   EIGEN  226
      JCU    =  JCL + I - 1                                             EIGEN  227
      CALL RITVEC (JCL, JCU, BUFFER, ISCR)                              EIGEN  228
```

```
  140 CONTINUE
      CALL DCLOSE (ISCR)
C
C FORM THE COEFFICIENT MATRIX FOR THE STANDARD EIGENVALUE PROBLEM
C
C
C FORM THE COEFFICIENT MATRIX THROUGH THE PRODUCT OF - (INVERSE OF L)
C TIMES (MASS) TIMES (INVERSE OF L TRANSPOSE)
C NOTE THAT THE COEFFICIENT MATRIX MUST BE IN COLUMN SORT FOR USE IN
C THE SYMEIG ROUTINE.
C THE SWAP   ROUTINE IS BEING CALLED AT THE END OF THE COEFFICIENT
C MATRIX CALCULATION IN ORDER TO ARRANGE THE COEFFICIENT MATRIX
C IN COLUMN SORT.
C
C
C     FIRST READ MASS MATRIX INTO CORE
      IPOS(ISCR)=IFCOM
      CALL READMA (ISCR,IROW,BUFFER,NAME)
C
C     NOW FORM MATRIX PRODUCT
C
      IPOS(ISCR)=IFCOM+1
      NFIL  = IPOS(ISCR)
      CALL GEDLAB (8HEIGEN 01,ISCR,NAME,NFIL,IROWS,JCOLS)
      DO 10  I=1,IROW
      JCOL    =  I
      CALL GETROW (ISCR,1,Q,JCOL)
      X=-Q(I)
      Q(I)=-1.
      DO 20 J=1,I
   20 Q(J)=Q(J)/X
   10 CALL DAGGER (A,IROW,Q,I,A(INDEX))
      CALL DCLOSE (ISCR)
      CALL SWAP (A,IROW)
      GOTO 16
C
C
   14 CONTINUE
C
C FLEXIBILITY MATRIX APPROACH.
C FORM THE COEFFICIENT MATRIX THROUGH THE PRODUCT OF - (L TRANSPOSE)
C TIMES (FLEXIBILITY) TIMES (L).
C NOTE THAT THE COEFFICIENT MATRIX MUST BE IN COLUMN SORT FOR USE IN
C THE SYMEIG ROUTINE.
C
C     WRITE L-MATRIX OUT IN ROW SORT ON I/O UNIT
      NFIL   =  IPOS(ISCR)
      CALL PUDLAB (8HEIGEN 02,ISCR,NAME2,NFIL,IROW,IROW)
      JCL    =  1
      DO 141  I=1,IROW
      JCU    =  JCL + I - 1
      CALL RITVEC (JCL, JCU, BUFFER, ISCR)
      JCL    =  JCL + I
  141 CONTINUE
      CALL DCLOSE (ISCR)
      IPOS(ISCR)=IFCOM+2
C
```

```
                 SUBROUTINE RITVEC (JCL,JCU,BUFFER,ISCR)                       RITVEC     2
           C                                                                   RITVEC     3
           C                                                                   RITVEC     4
                 DIMENSION A(25000)                                            RITVEC     5
                 DIMENSION      BUFFER(1)                                      RITVEC     6
           C                                                                   RITVEC     7
           C                                                                   RITVEC     8
                 COMMON /CPMASS/ A                                             RITVEC     9
                 DO 151  J=JCL,JCU                                             RITVEC    10
                 JB     =  J - JCL + 1                                         RITVEC    11
             151 BUFFER(JB)  =  A(J)                                           RITVEC    12
                 JCOL   =   JCU - JCL + 1                                      RITVEC    13
                 CALL PUTROW (ISCR, 1, BUFFER, JCOL)                           RITVEC    14
                 RETURN                                                        RITVEC    15
                 END                                                           RITVEC    16
```

```
      SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS     DEF LINE     REFERENCES
    3  RITVEC          1         14

VARIABLES      SN  TYPE            RELOCATION
    0  A           REAL       ARRAY    CPMASS       REFS        4         8        11
    0  BUFFER      REAL       ARRAY     F.P.        REFS        5        13   DEFINED         1        11
    0  ISCR        INTEGER              F.P.        REFS       13   DEFINED         1
   36  J           INTEGER                          REFS       10        11   DEFINED         9
   37  JB          INTEGER                          REFS       11   DEFINED        10
    0  JCL         INTEGER              F.P.        REFS        9        10        12   DEFINED         1
   40  JCOL        INTEGER                          REFS       13   DEFINED        12
    0  JCU         INTEGER              F.P.        REFS        9        12   DEFINED         1

EXTERNALS            TYPE   ARGS        REFERENCES
       PUTROW                  4               13

STATEMENT LABELS              DEF LINE   REFERENCES
    0  151                        11          9

LOOPS  LABEL     INDEX      FROM-TO     LENGTH    PROPERTIES
   13  151       J             9 11        4B      INSTACK

COMMON BLOCKS    LENGTH      MEMBERS - BIAS NAME(LENGTH)
       CPMASS    25000                 0 A       (25000)

STATISTICS
  PROGRAM LENGTH                41B       33
  CM LABELED COMMON LENGTH   60650B    25000
         52000B CM USED
```

```
LOOPS  LABEL    INDEX      FROM-TO    LENGTH    PROPERTIES
   17  105      J            13 20       25B              EXT REFS  NOT INNER
   35  100      K            17 19        4B     INSTACK

COMMON BLOCKS    LENGTH     MEMBERS - BIAS NAME(LENGTH)
       CPMASS     25000                0 A      (25000)
       FILE           1                0 IPOS   (1)

STATISTICS
  PROGRAM LENGTH                105B      69
  CM LABELED COMMON LENGTH    60651B   25001
          52000B CM USED
```

```
             SUBROUTINE READMA (ISCR,IROW,BUFFER,NAME)                 READMA      2
       C                                                               READMA      3
             DIMENSION A(25000)                                        READMA      4
             DIMENSION BUFFER(1)                                       READMA      5
             DIMENSION IPOS(1)                                         READMA      6
             DIMENSION NAME(1)                                         READMA      7
       C                                                               READMA      8
             COMMON /CPMASS/ A                                         READMA      9
             COMMON /FILE  / IPOS                                      READMA     10
       C                                                               READMA     11
             NFIL  = IPOS(ISCR)                                        READMA     12
             CALL GEDLAB (6HREADMA,ISCR,NAME,NFIL,IROW,IROW)           READMA     13
             DO 105 J=1,IROW                                           READMA     14
             IANS6 = (((J-1)**2+(J-1))/2) + 1                          READMA     15
             ILIM1 = IANS6 + J - 1                                     READMA     16
             CALL GETROW (ISCR, 1, BUFFER, IROW)                       READMA     17
             DO 100  K=IANS6,ILIM1                                     READMA     18
             KB  =  K - IANS6 + 1                                      READMA     19
         100 A(K)  = BUFFER(KB)                                        READMA     20
         105 CONTINUE                                                  READMA     21
             CALL DCLOSE (ISCR)                                        READMA     22
             RETURN                                                    READMA     23
             END                                                       READMA     24
```

SYMBOLIC REFERENCE MAP (R=3)

```
ENTRY POINTS      DEF LINE      REFERENCES
    3  READMA         1           22

VARIABLES       SN  TYPE            RELOCATION
    0  A            REAL       ARRAY   CPMASS      REFS      3       8   DEFINED     19
    0  BUFFER       REAL       ARRAY    F.P.       REFS      4      16        19   DEFINED      1
   71  IANS6        INTEGER                        REFS     15      17        18   DEFINED     14
   72  ILIM1        INTEGER                        REFS     17  DEFINED       15
    0  IPOS         INTEGER    ARRAY   FILE        REFS      5       9        11
    0  IROW         INTEGER             F.P.       REFS   2*12      13        16   DEFINED      1
    0  ISCR         INTEGER             F.P.       REFS     11      12        16        21   DEFINED      1
   70  J            INTEGER                        REFS   2*14      15   DEFINED      13
   73  K            INTEGER                        REFS     18      19   DEFINED      17
   74  KB           INTEGER                        REFS     19  DEFINED       18
    0  NAME         INTEGER    ARRAY    F.P.       REFS      6      12   DEFINED       1
   67  NFIL         INTEGER                        REFS     12  DEFINED       11

EXTERNALS           TYPE    ARGS        REFERENCES
       DCLOSE                 1             21
       GEDLAB                 6             12
       GETROW                 4             16

STATEMENT LABELS               DEF LINE    REFERENCES
    0  100                        19          17
    0  105                        20          13
```

```
COMMON BLOCKS   LENGTH     MEMBERS - BIAS NAME(LENGTH)
                                   66 IUDUM3 (1)              67 IFDUM3 (1)              68 IUL    (1)
                                   69 IFL    (1)              70 IUYT   (1)              71 IFYT   (1)
                                   72 IUZ    (1)              73 IFZ    (1)              74 IUZR   (1)
                                   75 IFZR   (1)              76 IULR   (1)              77 IFLR   (1)
                                   78 IUBR   (1)              79 IFBR   (1)              80 IUPHTF (1)
                                   81 IFPHTF (1)              82 IUMODM (1)              83 IFMODM (1)
                                   84 IUMODK (1)              85 IFMODK (1)              86 IUPHT  (1)
                                   87 IFPHT  (1)              88 IUQT   (1)              89 IFQT   (1)
                                   90 IUQ    (1)              91 IFQ    (1)              92 IUPH   (1)
                                   93 IFPH   (1)              94 IUINCM (1)              95 IFINCM (1)
                                   96 IUINCK (1)              97 IFINCK (1)
    PLAYFF         26               0 IUMDFF (1)               1 IFMDFF (1)               2 IUDLTI (1)
                                    3 IFDLTI (1)               4 IUSLTI (1)               5 IFSLTI (1)
                                    6 IUMPLI (1)               7 IFMPLI (1)               8 IUTPGT (1)
                                    9 IFTPGT (1)              10 IUPATF (1)              11 IFPATF (1)
                                   12 IUMPL  (1)              13 IFMPL  (1)              14 IUSLT  (1)
                                   15 IFSLT  (1)              16 IUDLT  (1)              17 IFDLT  (1)
                                   18 IUQA   (1)              19 IFQA   (1)              20 IUQAT  (1)
                                   21 IFQAT  (1)              22 IUPHA  (1)              23 IFPHA  (1)
                                   24 IUPHAT (1)              25 IFPHAT (1)
    KLUFF           1               0 KFREE  (1)
    VKLUE         443               0 NROOTS (1)               1 NDOFFF (1)               2 NZERO  (1)
                                    3 IDFV   (220)           223 IDFF   (220)

EQUIV CLASSES   LENGTH     MEMBERS - BIAS NAME(LENGTH)
    Q            1760             220 QQ     (220)

STATISTICS
  PROGRAM LENGTH                5675B    3005
  CM LABELED COMMON LENGTH     62112B   25674
        52000B CM USED
```

```
LOOPS  LABEL    INDEX      FROM-TO     LENGTH    PROPERTIES
  256  150      I          295 299        12B              EXT REFS
  306  70       I          308 354       122B              EXT REFS  NOT INNER
  317  73       II         311 312         2B     INSTACK
  326  77       J1         319 322        12B              EXT REFS
  341  71       J          324 339        32B              EXT REFS  NOT INNER
  346  72       K          330 336        13B        OPT
  374  76       J          344 350        21B              EXT REFS
  435  19       I          362 370        24B              EXT REFS  NOT INNER
  452  240      J          367 369         4B     INSTACK
  473  300      I          380 381         3B     INSTACK
  500  310      I          382 383         7B              EXT REFS
  512  315      I          385 396        27B              EXT REFS
  547  30       I          403 411        27B              EXT REFS  NOT INNER
  562  250      J          406 408         4B     INSTACK
  607  220      I          429 436        23B              EXT REFS  NOT INNER
  622  210      J          433 435         4B     INSTACK
  650  50       I          446 450        15B              EXT REFS

COMMON BLOCKS   LENGTH     MEMBERS - BIAS NAME(LENGTH)
       CPMASS    25000              0 A      (25000)
       COMRWP        3              0 ITAPER (1)            1 ITAPEW (1)            2 ITAPEP (1)
       DSRN          1              0 JSETUP (1)
       FILE          1              0 IPOS   (1)
       REPORT        1              0 KREPOR (1)
       CTSHV         2              0 LTSHV  (1)            1 TSHV   (1)
       CLIST        11              0 KOUNT  (1)            1 KPAGE  (1)            2 LINES  (1)
                                    3 LINEST (1)            4 KLABEL (1)            5 KTPAGE (1)
                                    6 NPAGE  (1)            7 KBPAGE (1)            8 LINESG (1)
                                    9 KOUNTH (1)           10 KOUNTI (1)
       CTABLE        8              0 KTABLE (1)            1 NPASS  (1)            2 NROWS  (1)
                                    3 NCOLS  (1)            4 NCOLST (1)            5 KTABLO (1)
                                    6 NPAGEA (1)            7 ITAPET (1)
       CFILES        2              0 KFILES (1)            1 IFILES (1)
       CTITLE       37              0 LTITLE (1)            1 TITLE  (36)
       FREAKS       40              0 FREQ   (40)
       PLACES       98              0 IUIN1  (1)            1 IUIN2  (1)            2 IUOUT1 (1)
                                    3 IUOUT2 (1)            4 IUGO1  (1)            5 IUGO2  (1)
                                    6 IUGO3  (1)            7 IUGO4  (1)            8 IUSCR  (1)
                                    9 IFSCR  (1)           10 IFS1   (1)           11 IFS2   (1)
                                   12 IFS3   (1)           13 IFS4   (1)           14 IUCD   (1)
                                   15 IUPR   (1)           16 IUA    (1)           17 IFA    (1)
                                   18 IUY    (1)           19 IFY    (1)           20 IUMEMN (1)
                                   21 IFMEMN (1)           22 IUSTFN (1)           23 IFSTFN (1)
                                   24 IUKS   (1)           25 IFKS   (1)           26 IUB    (1)
                                   27 IFB    (1)           28 IUDESO (1)           29 IFDESO (1)
                                   30 IUMDBI (1)           31 IFMDBI (1)           32 IUADDI (1)
                                   33 IFADDI (1)           34 IUBALI (1)           35 IFBALI (1)
                                   36 IUDESI (1)           37 IFDESI (1)           38 IUWTI  (1)
                                   39 IFWTI  (1)           40 IUMEMO (1)           41 IFMEMO (1)
                                   42 IUBT   (1)           43 IFBT   (1)           44 IUDESN (1)
                                   45 IFDESN (1)           46 IUMD   (1)           47 IFMD   (1)
                                   48 IUMEMF (1)           49 IFMEMF (1)           50 IUSTFO (1)
                                   51 IFSTFO (1)           52 IUMDB  (1)           53 IFMDB  (1)
                                   54 IUADD  (1)           55 IFADD  (1)           56 IUBAL  (1)
                                   57 IFBAL  (1)           58 IUDESF (1)           59 IFDESF (1)
                                   60 IUWT   (1)           61 IFWT   (1)           62 IUDUM1 (1)
                                   63 IFDUM1 (1)           64 IUDUM2 (1)           65 IFDUM2 (1)
```

```
EXTERNALS          TYPE    ARGS        REFERENCES
      SYMEIG                10             379       404
      TITLES                 1             174       196        388
      TRIEQ                  5             448

INLINE FUNCTIONS   TYPE    ARGS          DEF LINE  REFERENCES
      ABSF       REAL        1     SF      126
      MAXOF      INTEGER     2     SF      128
      MINOF      INTEGER     2     SF      129
      SQRTF      REAL        1     SF      127       383

STATEMENT LABELS                  DEF LINE   REFERENCES
    0  2           INACTIVE         207        206
  114  3                            212        206
  112  4                            209        206
   51  9                            161        159
    0  10                           260        253
   67  11                           183        169
    0  12          INACTIVE         206
   77  13                           194        180
  213  14                           266        215
  463  16                           378        263
    0  19                           370        362
    0  20                           259        258
    0  30                           411        403
 1233  41       FMT                 457        207
 1241  42       FMT                 458        209
    0  50                           450        446
 1245  51       FMT                 459        390
 1252  56       FMT                 460        394
    0  70                           354        308
    0  71                           339        324
    0  72                           336        330
    0  73                           312        311
  353  74                           334        331
  356  75                           335        333
    0  76                           350        344
    0  77                           322        319
  404  78                           348        346
    0  140                          229        225
    0  141                          282        278
    0  150                          299        295
    0  210                          435        433
    0  220                          436        429
    0  240                          369        367
    0  250                          408        406
    0  300                          381        380
    0  310                          383        382
  530  312                          393        389
    0  315                          396        385
  671  500                          453        208
 1255  1000     FMT                 461        160

LOOPS  LABEL     INDEX     FROM-TO     LENGTH     PROPERTIES
  127  140       I         225 229       11B                EXT REFS
  160  10        I         253 260       25B                EXT REFS   NOT INNER
  172  20        J         258 259        3B        INSTACK
```

```
VARIABLES      SN  TYPE                RELOCATION
     0  LTSHV      INTEGER                 CTSHV          REFS        90
  1203  MASS       INTEGER                                REFS       147    DEFINED      135
  5552  MATNAM     INTEGER     ARRAY                      REFS        79       152       153    DEFINED      134
  1204  MATR       INTEGER                                REFS       146    DEFINED      136
  5554  NAME       INTEGER     ARRAY                      REFS        80       176       246        252      310      361      427
                                                           443
  1272  NAMER      INTEGER                                REFS       207    DEFINED      152        153
  5556  NAME2      INTEGER     ARRAY                      REFS        80       223       276        294  DEFINED      137      146
                                                           147
  5560  NAME3      INTEGER     ARRAY                      REFS        80       445   DEFINED         138
  5562  NAME4      INTEGER     ARRAY                      REFS        80       307   DEFINED         139
  5564  NAME5      INTEGER     ARRAY                      REFS        80       402   DEFINED         140
     3  NCOLS      INTEGER                 CTABLE         REFS        93
     4  NCOLST     INTEGER                 CTABLE         REFS        93
     0  NCYC       INTEGER                  F.P.          REFS       159    DEFINED       68
     1  NDOFFF     INTEGER                 VKLUE          REFS       120    DEFINED      160
  1306  NDOT       INTEGER                                REFS       338    DEFINED      313
  1310  NDOTV      INTEGER                                REFS       321    DEFINED      320
  1314  NDOT1      INTEGER                                REFS       347       349   DEFINED         345
  1274  NFIL       INTEGER                                REFS       223       252       276        294      307      310      361
                                                           402       427       443       445    DEFINED      222      251      275
                                                           293       306       309       360        401      426      442      444
  1273  NIX        INTEGER                                REFS       205       206   DEFINED         179      185
     6  NPAGE      INTEGER                 CLIST          REFS        91
     6  NPAGEA     INTEGER                 CTABLE         REFS        93
     1  NPASS      INTEGER                 CTABLE         REFS        93
     0  NROOTS     INTEGER                 VKLUE          REFS       120       379       380        382      385      402      403
                                                           404       445       446   DEFINED         160
     2  NROWS      INTEGER                 CTABLE         REFS        93
     2  NZERO      INTEGER                 VKLUE          REFS       120    DEFINED      160
  1322  Q          REAL        ARRAY                      REFS        82       122       255        256      259      260      338
                                                           352       379       381       404        447      448      449
                                                       DEFINED       257       259       312        335      349
  1656  QQ         REAL        ARRAY                      REFS        82       122       349    DEFINED      338
  1313  SUM        REAL                                   REFS       338       349   DEFINED         337      348
     1  TITLE      REAL        ARRAY       CTITLE         REFS        83        96
     1  TSHV       REAL        ARRAY       CTSHV          REFS        83        90
  1303  X          REAL                                   REFS       259    DEFINED      256
        VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS            TYPE     ARGS          REFERENCES
        COMPAK                  2              191       304
        DAGGER                  5              260
        DCLOSE                  1              230       261       283       300       353        355      371      412      437
                                               451       452
        FUTILE                  3              205
        GEDLAB                  6              252       310       361       427       443
        GETROW                  4              255       321       347       366       432        447
        PLB                     3              391
        PROGNA                  2              154       195       305
        PUDLAB                  6              223       276       294       307       402        445
        PUTROW                  4              352       410       449
        READMA                  4              176       246
        RITVEC                  4              227       280       298
        SCAPRO       REAL       6              338       349
        SQRT         REAL       1 LIBRARY      383
        SWAP                    2              262       289
```

```
VARIABLES      SN  TYPE            RELOCATION
  120  IUPHTF      INTEGER              PLACES      REFS        98
   17  IUPR        INTEGER              PLACES      REFS        98
  132  IUQ         INTEGER              PLACES      REFS        98
   22  IUQA        INTEGER              PLAYFF      REFS       115
   24  IUQAT       INTEGER              PLAYFF      REFS       115
  130  IUQT        INTEGER              PLACES      REFS        98
   10  IUSCR       INTEGER              PLACES      REFS        98
   16  IUSLT       INTEGER              PLAYFF      REFS       115
    4  IUSLTI      INTEGER              PLAYFF      REFS       115
   26  IUSTFN      INTEGER              PLACES      REFS        98
   62  IUSTFO      INTEGER              PLACES      REFS        98
   10  IUTPGT      INTEGER              PLAYFF      REFS       115
   74  IUWT        INTEGER              PLACES      REFS        98
   46  IUWTI       INTEGER              PLACES      REFS        98
   22  IUY         INTEGER              PLACES      REFS        98
  106  IUYT        INTEGER              PLACES      REFS        98
  110  IUZ         INTEGER              PLACES      REFS        98
  112  IUZR        INTEGER              PLACES      REFS        98
 1304  J           INTEGER                          REFS     2*259      331     3*332     334      338      345      346
                                                     347     3*349      368      369      407      408      434      435
                                                 DEFINED       258      324      344      367      406      433
 1317  JB          INTEGER                          REFS       369      408      435  DEFINED      368      407      434
 1275  JCL         INTEGER                          REFS       226      227      228      279      280      281      298
                                                     430       433      434      436  DEFINED      224      228      277
                                                     281       297      428      436
 1302  JCOL        INTEGER                          REFS       255      352      366      410      432
                                                 DEFINED       254      351      365      409      431
 1301  JCOLS       INTEGER                          REFS       252      361      427      443
 1277  JCU         INTEGER                          REFS       227      280      297      298      433
                                                 DEFINED       226      279      296      430
 1266  JSCR        INTEGER                          REFS       307      352      355      361      366      371      401
                                                     402       410      412      442      443      447      452
                                                 DEFINED       145
    0  JSETUP      INTEGER     ARRAY    DSRN        REFS        78       87
 1307  J1          INTEGER                          REFS       320  DEFINED      319
 1311  K           INTEGER                          REFS       331      332    3*334      335  DEFINED      330
    7  KBPAGE      INTEGER              CLIST       REFS        91
    0  KFILES      INTEGER              CFILES      REFS        95
    0  KFREE       INTEGER              KLUFF       REFS       119      143      144
    4  KLABEL      INTEGER              CLIST       REFS        91
    0  KMATV       INTEGER               F.P.       REFS       146      147      153      169      215
                                                 DEFINED        68
    0  KOUNT       INTEGER              CLIST       REFS        91      386      389      392      395
                                                 DEFINED       384      387      392      395
   11  KOUNTH      INTEGER              CLIST       REFS        91      389
   12  KOUNTI      INTEGER              CLIST       REFS        91
    1  KPAGE       INTEGER              CLIST       REFS        91
    0  KREPOR      INTEGER              REPORT      REFS        89
    0  KTABLE      INTEGER              CTABLE      REFS        93
    5  KTABLO      INTEGER              CTABLE      REFS        93
    5  KTPAGE      INTEGER              CLIST       REFS        91
 1270  L           INTEGER                          REFS       448  DEFINED      149
 1320  LEFT        INTEGER                          REFS       387  DEFINED      386
    2  LINES       INTEGER              CLIST       REFS        91      384      386      387
   10  LINESG      INTEGER              CLIST       REFS        91
    3  LINEST      INTEGER              CLIST       REFS        91
    0  LTITLE      INTEGER              CTITLE      REFS        96
```

```
VARIABLES      SN  TYPE            RELOCATION
     0 ISCR        INTEGER               F.P.     REFS      175     176     178     184     222     223     227
                                                   230      245     246     250     251     252     255     261
                                                   275      276     280     283     284     293     294     298
                                                   300      309     310     321     347     353     417     426
                                                   427      432     437     444     445     449     451
                                                DEFINED      68     141     143
     2 ITAPEP      INTEGER            COMRWP      REFS       86
     0 ITAPER      INTEGER            COMRWP      REFS       86  I/O REFS     160
     7 ITAPET      INTEGER            CTABLE      REFS       93
     1 ITAPEW      INTEGER            COMRWP      REFS       86     391  I/O REFS     207     209     390     394
    20 IUA         INTEGER            PLACES      REFS       98
    66 IUADD       INTEGER            PLACES      REFS       98
    40 IUADDI      INTEGER            PLACES      REFS       98
    32 IUB         INTEGER            PLACES      REFS       98
    70 IUBAL       INTEGER            PLACES      REFS       98
    42 IUBALI      INTEGER            PLACES      REFS       98
   116 IUBR        INTEGER            PLACES      REFS       98
    52 IUBT        INTEGER            PLACES      REFS       98
    16 IUCD        INTEGER            PLACES      REFS       98
    72 IUDESF      INTEGER            PLACES      REFS       98
    44 IUDESI      INTEGER            PLACES      REFS       98
    54 IUDESN      INTEGER            PLACES      REFS       98
    34 IUDESO      INTEGER            PLACES      REFS       98
    20 IUDLT       INTEGER            PLAYFF      REFS      115
     2 IUDLTI      INTEGER            PLAYFF      REFS      115
    76 IUDUM1      INTEGER            PLACES      REFS       98
   100 IUDUM2      INTEGER            PLACES      REFS       98
   102 IUDUM3      INTEGER            PLACES      REFS       98
     4 IUGO1       INTEGER            PLACES      REFS       98
     5 IUGO2       INTEGER            PLACES      REFS       98
     6 IUGO3       INTEGER            PLACES      REFS       98     145
     7 IUGO4       INTEGER            PLACES      REFS       98
   140 IUINCK      INTEGER            PLACES      REFS       98
   136 IUINCM      INTEGER            PLACES      REFS       98
     0 IUIN1       INTEGER            PLACES      REFS       98
     1 IUIN2       INTEGER            PLACES      REFS       98
    30 IUKS        INTEGER            PLACES      REFS       98
   104 IUL         INTEGER            PLACES      REFS       98
   114 IULR        INTEGER            PLACES      REFS       98
    56 IUMD        INTEGER            PLACES      REFS       98     141
    64 IUMDB       INTEGER            PLACES      REFS       98
    36 IUMDBI      INTEGER            PLACES      REFS       98
     0 IUMDFF      INTEGER            PLAYFF      REFS      115     143
    60 IUMEMF      INTEGER            PLACES      REFS       98
    24 IUMEMN      INTEGER            PLACES      REFS       98
    50 IUMEMO      INTEGER            PLACES      REFS       98
   124 IUMODK      INTEGER            PLACES      REFS       98
   122 IUMODM      INTEGER            PLACES      REFS       98
    14 IUMPL       INTEGER            PLAYFF      REFS      115
     6 IUMPLI      INTEGER            PLAYFF      REFS      115
     2 IUOUT1      INTEGER            PLACES      REFS       98
     3 IUOUT2      INTEGER            PLACES      REFS       98
    12 IUPATF      INTEGER            PLAYFF      REFS      115
   134 IUPH        INTEGER            PLACES      REFS       98
    26 IUPHA       INTEGER            PLAYFF      REFS      115
    30 IUPHAT      INTEGER            PLAYFF      REFS      115
```

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VARIABLES      SN  TYPE              RELOCATION
  105  IFL         INTEGER                PLACES      REFS       98
  115  IFLR        INTEGER                PLACES      REFS       98
   57  IFMD        INTEGER                PLACES      REFS       98      142
   65  IFMDB       INTEGER                PLACES      REFS       98
   37  IFMDBI      INTEGER                PLACES      REFS       98
    1  IFMDFF      INTEGER                PLAYFF      REFS      115      144
   61  IFMEMF      INTEGER                PLACES      REFS       98
   25  IFMEMN      INTEGER                PLACES      REFS       98
   51  IFMEMO      INTEGER                PLACES      REFS       98
  125  IFMODK      INTEGER                PLACES      REFS       98
  123  IFMODM      INTEGER                PLACES      REFS       98
   15  IFMPL       INTEGER                PLAYFF      REFS      115
    7  IFMPLI      INTEGER                PLAYFF      REFS      115
   13  IFPATF      INTEGER                PLAYFF      REFS      115
  135  IFPH        INTEGER                PLACES      REFS       98
   27  IFPHA       INTEGER                PLAYFF      REFS      115
   31  IFPHAT      INTEGER                PLAYFF      REFS      115
  127  IFPHT       INTEGER                PLACES      REFS       98
  121  IFPHTF      INTEGER                PLACES      REFS       98
  133  IFQ         INTEGER                PLACES      REFS       98
   23  IFQA        INTEGER                PLAYFF      REFS      115
   25  IFQAT       INTEGER                PLAYFF      REFS      115
  131  IFQT        INTEGER                PLACES      REFS       98
   11  IFSCR       INTEGER                PLACES      REFS       98
   17  IFSLT       INTEGER                PLAYFF      REFS      115
    5  IFSLTI      INTEGER                PLAYFF      REFS      115
   27  IFSTFN      INTEGER                PLACES      REFS       98
   63  IFSTFO      INTEGER                PLACES      REFS       98
   12  IFS1        INTEGER                PLACES      REFS       98
   13  IFS2        INTEGER                PLACES      REFS       98
   14  IFS3        INTEGER                PLACES      REFS       98      306       360
   15  IFS4        INTEGER                PLACES      REFS       98
   11  IFTPGT      INTEGER                PLAYFF      REFS      115
   75  IFWT        INTEGER                PLACES      REFS       98
   47  IFWTI       INTEGER                PLACES      REFS       98
   23  IFY         INTEGER                PLACES      REFS       98
  107  IFYT        INTEGER                PLACES      REFS       98
  111  IFZ         INTEGER                PLACES      REFS       98
  113  IFZR        INTEGER                PLACES      REFS       98
 1305  II          INTEGER                            REFS      312   DEFINED       311
 1316  ILIM        INTEGER                            REFS      365      367   DEFINED       364
 1321  IN          INTEGER                            REFS      406      409   DEFINED       405
 1271  INDEX       INTEGER                            REFS      151      260       379       404       406       407       409
                                                   DEFINED      150
    0  INDEX1      INTEGER                F.P.        REFS      405   DEFINED        68       151
 1267  INDIC8      INTEGER                            REFS      448   DEFINED       148
    0  IPOS        INTEGER      ARRAY     FILE        REFS       77       88       222       251       275       293       309
                                                       401      426      442       444   DEFINED       175       178       184
                                                       245      250      284       417
    0  IROW        INTEGER                F.P.        REFS    3*150      176       191       205     2*223       225       246
                                                       253      260      262     2*276       278       289     2*294       295
                                                       296      297      304     2*307       308     2*310       311       313
                                                       320      324      330       344       345       351       362       363
                                                       364    2*379      402     2*404       405       429       445       447
                                                       448      449   DEFINED        68
    0  IROWD       INTEGER                F.P.        REFS      191      304   DEFINED        68
 1300  IROWS       INTEGER                            REFS      252      361       427       443
```

```
             41 FORMAT (5X,1A4,32H MATRIX IS NOT POSITIVE DEFINITE  )     EIGEN    458
             42 FORMAT(19H OVERFLOW IN FUTILE  )                          EIGEN    459
             51 FORMAT (10X, 4X, 1HM, 2X, 16HFREQUENCIES, CPS)            EIGEN    460
   460       56 FORMAT(/,10X,I5,F14.4)                                    EIGEN    461
           1000 FORMAT (10I4)                                             EIGEN    462
                RETURN                                                    EIGEN    463
                END                                                       EIGEN    464


    SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS     DEF LINE     REFERENCES
    3  EIGEN         68        462

VARIABLES      SN  TYPE            RELOCATION
    0  A           REAL       ARRAY     CPMASS     REFS        75      85     205   2*260     262     289     335
                                                  2*379   2*404     408     448 DEFINED     369     435
 4662  BUFFER      REAL       ARRAY                REFS        75     176     227     246     280     298     321
                                                    338     347     349     366     369     410     432     435
                                                DEFINED     408
    0  FREQ        REAL       ARRAY     FREAKS     REFS        76      97     383     394 DEFINED     381     383
 1276  I           INTEGER                         REFS       226     228     254     256     257     258     260
                                                    279     281   4*296     297     313     319     321   2*338
                                                    344     346     351     352   3*363     364     379   2*381
                                                  2*383   2*394     404     430     431     436
                                                DEFINED     225     253     278     295     308     362     380
                                                    382     385     403     429     446
 1315  IANS1       INTEGER                         REFS       364     365     367     368 DEFINED     363
 1312  IANS2       INTEGER                         REFS       335 DEFINED     332     334
  337  IDFF        INTEGER    ARRAY     VKLUE      REFS       120
    3  IDFV        INTEGER    ARRAY     VKLUE      REFS       120
   21  IFA         INTEGER              PLACES     REFS        98
   67  IFADD       INTEGER              PLACES     REFS        98
   41  IFADDI      INTEGER              PLACES     REFS        98
   33  IFB         INTEGER              PLACES     REFS        98
   71  IFBAL       INTEGER              PLACES     REFS        98
   43  IFBALI      INTEGER              PLACES     REFS        98
  117  IFBR        INTEGER              PLACES     REFS        98
   53  IFBT        INTEGER              PLACES     REFS        98
 1265  IFCOM       INTEGER                         REFS       175     178     184     245     250     284     417
                                                DEFINED     142     144
   73  IFDESF      INTEGER              PLACES     REFS        98
   45  IFDESI      INTEGER              PLACES     REFS        98
   55  IFDESN      INTEGER              PLACES     REFS        98
   35  IFDESO      INTEGER              PLACES     REFS        98
   21  IFDLT       INTEGER              PLAYFF     REFS       115
    3  IFDLTI      INTEGER              PLAYFF     REFS       115
   77  IFDUM1      INTEGER              PLACES     REFS        98
  101  IFDUM2      INTEGER              PLACES     REFS        98
  103  IFDUM3      INTEGER              PLACES     REFS        98
    1  IFILES      INTEGER    ARRAY     CFILES     REFS        77      95
  141  IFINCK      INTEGER              PLACES     REFS        98
  137  IFINCM      INTEGER              PLACES     REFS        98
   31  IFKS        INTEGER              PLACES     REFS        98
```

```
      C                                                                    EIGEN     401
            NFIL  = IPOS(JSCR)                                             EIGEN     402
            CALL PUDLAB (8HEIGEN 05,JSCR,NAME5,NFIL,NROOTS,IROW)           EIGEN     403
            DO 30 I=1,NROOTS                                               EIGEN     404
            CALL SYMEIG (A,IROW,1,NROOTS,Q,A(INDEX),I,1,IROW,2)            EIGEN     405
            IN  = INDEX1 + IROW                                            EIGEN     406
            DO 250 J=INDEX,IN                                              EIGEN     407
            JB      =  J - INDEX + 1                                       EIGEN     408
        250 BUFFER(JB) =  A(J)                                             EIGEN     409
            JCOL    =  IN - INDEX + 1                                      EIGEN     410
            CALL PUTROW (JSCR,1,BUFFER,JCOL)                               EIGEN     411
         30 CONTINUE                                                       EIGEN     412
            CALL DCLOSE (JSCR)                                             EIGEN     413
      C                                                                    EIGEN     414
      C                                RETURN TAPE ISCR TO POSITION        EIGEN     415
      C     WHERE L MATRIX IS WRITTEN IN ROW SORT.                         EIGEN     416
      C                                                                    EIGEN     417
            IPOS(ISCR)=IFCOM+1                                             EIGEN     418
      C                                                                    EIGEN     419
      C                                                                    EIGEN     420
      C                                                                    EIGEN     421
      C                                                                    EIGEN     422
      C     READ THE L MATRIX FROM TAPE FOR USE IN THE TRANSFORMATION      EIGEN     423
      C     OF THE EIGENVECTORS TO PHYSICAL COORDINATES.                   EIGEN     424
      C         (LOWER TRIANGLE ELEMENTS ONLY ARE PRESENT)                 EIGEN     425
      C                                                                    EIGEN     426
            NFIL  = IPOS(ISCR)                                             EIGEN     427
            CALL GEDLAB (8HEIGEN 04,ISCR,NAME,NFIL,IROWS,JCOLS)            EIGEN     428
            JCL     =  1                                                   EIGEN     429
            DO 220 I=1,IROW                                                EIGEN     430
            JCU     =  JCL + I - 1                                         EIGEN     431
            JCOL   =  I                                                    EIGEN     432
            CALL GETROW (ISCR,1,BUFFER,JCOL)                               EIGEN     433
            DO 210 J=JCL,JCU                                               EIGEN     434
            JB      =  J - JCL + 1                                         EIGEN     435
        210 A(J)    =  BUFFER(JB)                                          EIGEN     436
        220 JCL     =  JCL + I                                             EIGEN     437
            CALL DCLOSE (ISCR)                                             EIGEN     438
      C                                                                    EIGEN     439
      C                                                                    EIGEN     440
      C CALCULATE EIGEN VECTORS IN THE PHYSICAL COORDINATE SYSTEM AND STORE ON EIGEN 441
      C                                                                    EIGEN     442
            NFIL  = IPOS(JSCR)                                             EIGEN     443
            CALL GEDLAB (8HEIGEN 05,JSCR,NAME,NFIL,IROWS,JCOLS)            EIGEN     444
            NFIL  = IPOS(ISCR)                                             EIGEN     445
            CALL PUDLAB (8HEIGEN 06,ISCR,NAME3,NFIL,NROOTS,IROW)           EIGEN     446
            DO 50 I=1,NROOTS                                               EIGEN     447
            CALL GETROW (JSCR,1,Q,IROW)                                    EIGEN     448
            CALL TRIEQ (A,Q,IROW,L,INDIC8)                                 EIGEN     449
            CALL PUTROW (ISCR,1,Q,IROW)                                    EIGEN     450
         50 CONTINUE                                                       EIGEN     451
            CALL DCLOSE (ISCR)                                             EIGEN     452
            CALL DCLOSE (JSCR)                                             EIGEN     453
        500 CONTINUE                                                       EIGEN     454
      C                                                                    EIGEN     455
      C                                                                    EIGEN     456
      C FORMATS                                                            EIGEN     457
```

```
C                                                                       EIGEN    344
      DO 76  J=I,IROW                                                   EIGEN    345
      NDOT1  =  IROW - J + 1                                            EIGEN    346
      IF (J.EQ.I) GOTO 78                                               EIGEN    347
      CALL GETROW (ISCR, 1, BUFFER(J), NDOT1)                           EIGEN    348
   78 SUM  = 0.E0                                                       EIGEN    349
      Q(J) = SCAPRO (QQ(J), BUFFER(J), SUM, NDOT1, 1, 1)                EIGEN    350
   76 CONTINUE                                                          EIGEN    351
      JCOL   =  IROW - I + 1                                            EIGEN    352
      CALL PUTROW (JSCR,1,Q(I),JCOL)                                    EIGEN    353
      CALL DCLOSE(ISCR)                                                 EIGEN    354
   70 CONTINUE                                                          EIGEN    355
      CALL DCLOSE (JSCR)                                                EIGEN    356
C                                                                       EIGEN    357
C                                                                       EIGEN    358
C READ THE COEFFICIENT MATRIX FROM TAPE FOR USE IN SYMEIG ROUTINE.      EIGEN    359
C                                                                       EIGEN    360
      NFIL  = IFS3                                                      EIGEN    361
      CALL GEDLAB (8HEIGEN 03,JSCR,NAME,NFIL,IROWS,JCOLS)               EIGEN    362
      DO 19  I=1,IROW                                                   EIGEN    363
      IANS1 = IROW*(I-1) - ((I-1)*(I-2)/2) + 1                          EIGEN    364
      ILIM  =  IANS1 + IROW - I                                         EIGEN    365
      JCOL    =  ILIM - IANS1 + 1                                       EIGEN    366
      CALL GETROW (JSCR,1,BUFFER,JCOL)                                  EIGEN    367
      DO 240 J=IANS1,ILIM                                               EIGEN    368
      JB      =  J - IANS1 + 1                                          EIGEN    369
  240 A(J)    =  BUFFER(JB)                                             EIGEN    370
   19 CONTINUE                                                          EIGEN    371
      CALL DCLOSE (JSCR)                                                EIGEN    372
C                                                                       EIGEN    373
C                                                                       EIGEN    374
C CALCULATE EIGENVALUES (Q(I)) AND FREQUENCIES (FREQ(I)).               EIGEN    375
C NOTE THAT AT THIS POINT THE COEFFICIENT MATRIX IS STORED IN A(I)      EIGEN    376
C IN COLUMN SORT.                                                       EIGEN    377
C                                                                       EIGEN    378
   16 CONTINUE                                                          EIGEN    379
      CALL SYMEIG (A,IROW,1,NROOTS,Q,A(INDEX),I,1,IROW,1)               EIGEN    380
      DO 300 I=1,NROOTS                                                 EIGEN    381
  300 FREQ(I)=  1.0/Q(I)                                                EIGEN    382
      DO 310 I=1,NROOTS                                                 EIGEN    383
  310 FREQ(I) = SQRTF (FREQ(I)*386.4)/6.28318                           EIGEN    384
      KOUNT=LINES                                                       EIGEN    385
      DO 315 I=1,NROOTS                                                 EIGEN    386
      LEFT=LINES-KOUNT                                                  EIGEN    387
      IF(LEFT.LT.2) KOUNT=LINES                                         EIGEN    388
      CALL TITLES (2)                                                   EIGEN    389
      IF(KOUNT.GT.KOUNTH) GO TO 312                                     EIGEN    390
      WRITE(ITAPEW,51)                                                  EIGEN    391
      CALL PLB(1,1,ITAPEW)                                              EIGEN    392
      KOUNT=KOUNT+2                                                     EIGEN    393
  312 CONTINUE                                                          EIGEN    394
      WRITE(ITAPEW,56) I,FREQ(I)                                        EIGEN    395
      KOUNT=KOUNT+2                                                     EIGEN    396
  315 CONTINUE                                                          EIGEN    397
C                                                                       EIGEN    398
C                                                                       EIGEN    399
C CALCULATE EIGEN VECTORS IN THE TRANSFORMED COORDINATE SYSTEM          EIGEN    400
```

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      C     SINCE 'A' MATRIX IS SPLIT OF MASS, REARRANGE IN COLUMN SORT        EIGEN     287
      C     BEFORE STORING ON TAPE                                             EIGEN     288
      C                                                                        EIGEN     289
            CALL SWAP (A, IROW)                                                EIGEN     290
      C                                                                        EIGEN     291
      C     WRITE L-TRANSPOSE ON TAPE                                          EIGEN     292
      C                                                                        EIGEN     293
            NFIL  =  IPOS(ISCR)                                                EIGEN     294
            CALL PUDLAB (8HEIGEN 03,ISCR,NAME2,NFIL,IROW,IROW)                 EIGEN     295
            DO 150 I=1,IROW                                                    EIGEN     296
            JCU  = I*IROW - ((I*I - I)/2)                                      EIGEN     297
            JCL   =  JCU - IROW + I                                            EIGEN     298
            CALL RITVEC (JCL,JCU,BUFFER,ISCR)                                  EIGEN     299
        150 CONTINUE                                                           EIGEN     300
            CALL DCLOSE (ISCR)                                                 EIGEN     301
      C                                                                        EIGEN     302
      C     READ FLEXIBILITY MATRIX INTO CORE                                  EIGEN     303
      C                                                                        EIGEN     304
            CALL COMPAK (IROW, IROWD)                                          EIGEN     305
            CALL PROGNA(4H(EIG,4HEN ))                                         EIGEN     306
            NFIL         =  IFS3                                               EIGEN     307
            CALL PUDLAB (8HEIGEN 04,JSCR,NAME4,NFIL,IROW,IROW)                 EIGEN     308
            DO 70 I=1,IROW                                                     EIGEN     309
            NFIL  =   IPOS(ISCR)                                               EIGEN     310
            CALL GEDLAB (8HEIGEN 02,ISCR,NAME,NFIL,IROW,IROW)                  EIGEN     311
            DO 73 II=1,IROW                                                    EIGEN     312
         73 Q(II) = O.                                                         EIGEN     313
            NDOT  = IROW - I + 1                                               EIGEN     314
      C                                                                        EIGEN     315
      C     READ A COLUMN OF L MATRIX INTO CORE; COLUMN LENGTH IS              EIGEN     316
      C               NDOT = IROW - I + 1  AND IS LOADED AT POSITION I         EIGEN     317
      C               OF BUFFER ARRAY                                          EIGEN     318
      C                                                                        EIGEN     319
            DO 77  J1 =1,I                                                     EIGEN     320
            NDOTV  = IROW - J1 + 1                                             EIGEN     321
            CALL GETROW (ISCR,1,BUFFER(I),NDOTV)                               EIGEN     322
         77 CONTINUE                                                           EIGEN     323
      C                                                                        EIGEN     324
            DO 71  J=1,IROW                                                    EIGEN     325
      C     LOAD VECTOR Q FROM POSITION I WITH ELEMENTS OF FLEXIBILITY         EIGEN     326
      C     MATRIX (J,K)                                                       EIGEN     327
      C                          K GOING FROM I TO N                           EIGEN     328
      C     FLEXIBILITY MATRIX IS STORED IN CORE IN ROW SORT                   EIGEN     329
      C          (LOWER TRIANGLE ONLY)                                         EIGEN     330
            DO 72  K=1,IROW                                                    EIGEN     331
            IF (K.GT.J) GOTO 74                                                EIGEN     332
            IANS2 = (((J-1)*(J-1) + (J-1))/2) + K                              EIGEN     333
            GOTO 75                                                            EIGEN     334
         74 IANS2 = (((K-1)*(K-1) + (K-1))/2) + J                              EIGEN     335
         75 Q(K)  =  A(IANS2)                                                  EIGEN     336
         72 CONTINUE                                                           EIGEN     337
            SUM = O.EO                                                         EIGEN     338
            QQ(J) = SCAPRO(Q(I),BUFFER(I),SUM,NDOT,1,1)                        EIGEN     339
         71 CONTINUE                                                           EIGEN     340
      C                                                                        EIGEN     341
      C     MULTIPLY EVERY ROW OF L-TRANSPOSE MATRIX BY ITH COLUMN             EIGEN     342
      C     OF PREVIOUS PRODUCT STORED IN QQ.                                  EIGEN     343
```

```
      C45700, SUB. SYMEIG                                                 SYMEIG     2
      C                                                                   SYMEIG     3
      C*******************************************************************SYMEIG     4
      C                                                                  *SYMEIG     5
      C***  SUBROUTINE       *********************************************SYMEIG     6
      C                                                                  *SYMEIG     7
      C***  COMPUTER VERSION *********************************************SYMEIG     8
      C     ----------------                                             *SYMEIG     9
      C     IBM .... AS IS.                                              *SYMEIG    10
      C                                                                  *SYMEIG    11
      C     CDC .... AS IS.                                              *SYMEIG    12
      C                                                                  *SYMEIG    13
      C***  OBJECTIVE ****************************************************SYMEIG    14
      C     ---------                                                    *SYMEIG    15
      C  MASTER ROUTINE FOR EIGENVALUES AND (OPTIONALLY) EIGENVECTORS OF A SYMEIG    16
      C    REAL SYMMETRIC MATRIX STORED TRIANGULARLY IN CORE. THE HOUSEHOLDER SYMEIG 17
      C    REDUCTION TO TRIDIAGONAL FORM (SUBROUTINE TFORM) IS FOLLOWED BY A SYMEIG  18
      C    BISECTION TECHNIQUE (SUBROUTINE STURM) FOR THE ROOTS AND THEN IN- SYMEIG  19
      C    VERSE ITERATION (SUBROUTINE TRIVEC) FOR THE VECTORS.            SYMEIG    20
      C                                                                  *SYMEIG    21
      C***  INPUT/OUTPUT *************************************************SYMEIG    22
      C     ------------                                                 *SYMEIG    23
      C                                                                  *SYMEIG    24
      C***  SUMMARY OF SYMBOLS *******************************************SYMEIG    25
      C     ------------------                                           *SYMEIG    26
      C                                                                   SYMEIG    27
      C    A       -  THE TRIANGULAR ARRAY CONTAINING THE MATRIX. DURING EXEC- SYMEIG 28
      C                CUTION THE ARRAY IS CHANGED.                       SYMEIG    29
      C                                                                   SYMEIG    30
      C    M       -  ORDER OF A.                                         SYMEIG    31
      C                                                                   SYMEIG    32
      C    INDEX   -  INDEX OF FIRST EIGENVALUE REQUIRED.                 SYMEIG    33
      C                                                                   SYMEIG    34
      C    NUMBR   - NUMBER OF EIGENVALUES REQUIRED.                      SYMEIG    35
      C                                                                   SYMEIG    36
      C    R       - REAL ARRAY FOR THE ROOTS AND WORKING STORAGE. R MUST CON- SYMEIG 37
      C               TAIN AT LEAST 8*M WORDS AND START ON A D.P. BOUNDARY. SYMEIG  38
      C                                                                   SYMEIG    39
      C    TOL     - TOLERANCE. IF B IS THE MAG. OF LARGEST ROOT, THE ROOTS SYMEIG  40
      C               WILL USUALLY HAVE ERRORS AS LARGE AS B*TOL.         SYMEIG    41
      C                                                                  *SYMEIG    42
      C***  ERROR MESSAGES ***********************************************SYMEIG    43
      C     --------------                                               *SYMEIG    44
      C     NONE.                                                        *SYMEIG    45
      C                                                                  *SYMEIG    46
      C*******************************************************************SYMEIG    47
            SUBROUTINE SYMEIG (A,M,INDEX,NUMBR,R,X,LOW,KOUNT,MID,KSYMEI)  SYMEIG    48
      C                                                                   SYMEIG    49
            DIMENSION A(1),R(1)                                           SYMEIG    50
            DIMENSION X(MID,1)                                            SYMEIG    51
      C                                                                   SYMEIG    52
            COMMON /CVIBRA/ TOL   ,TOL1  ,TOL2  ,MINUS2                   SYMEIG    53
      C                                                                   SYMEIG    54
      C                                                                   SYMEIG    55
      C FUNCTION DEFINITION                                                SYMEIG    56
            AMIN1F(X,Y)   =   AMIN1(X,Y)                                  SYMEIG    57
      C                                                                   SYMEIG    58
```

```
            GO TO (50,80), KSYMEI                                             SYMEIG     59
         50 CONTINUE                                                          SYMEIG     60
      C                                                                       SYMEIG     61
      C                                                                       SYMEIG     62
      C CALCULATE EIGENVALUES                                                 SYMEIG     63
      C                                                                       SYMEIG     64
            LD = 1 + M                                                        SYMEIG     65
            LO = LD + M                                                       SYMEIG     66
            LS = LO + M                                                       SYMEIG     67
            LP = LS + M                                                       SYMEIG     68
            LQ = LP + M                                                       SYMEIG     69
            LR = LQ + M                                                       SYMEIG     70
            CALL TFORM(A,M,R(LD),R(LO),R(LS),R(LP))                           SYMEIG     71
            EPS     =  AMIN1F(TOL,TOL1)                                       SYMEIG     72
            CALL STURM(M,INDEX,NUMBR,R(LD),R('O),R(LS),R(LP),R,EPS)           SYMEIG     73
            GO TO 300                                                         SYMEIG     74
      C                                                                       SYMEIG     75
         80 CONTINUE                                                          SYMEIG     76
      C                                                                       SYMEIG     77
      C                                                                       SYMEIG     78
      C CALCULATE EIGEN VECTORS                                               SYMEIG     79
      C                                                                       SYMEIG     80
            CALL QSVEC(A,R(LD),R(LO),R(LP),R(LQ),R(LR),R(LS),M,ROOT,X(1,1),1) SYMEIG     81
            ROOT = R(LS-1)                                                    SYMEIG     82
            EPS     =  ROOT*TOL2                                              SYMEIG     83
            K = LOW                                                           SYMEIG     84
            DO 200  I = 1,KOUNT                                               SYMEIG     85
            ROOT = AMIN1F(ROOT-EPS,R(K))                                      SYMEIG     86
            CALL QSVEC(A,R(LD),R(LO),R(LP),R(LQ),R(LR),R(LS),M,ROOT,X(1,I),2) SYMEIG     87
        200 K = K + 1                                                         SYMEIG     88
      C                                                                       SYMEIG     89
        300 CONTINUE                                                          SYMEIG     90
            RETURN                                                            SYMEIG     91
            END                                                               SYMEIG     92
```

CARD NR.	SEVERITY	DETAILS	DIAGNOSIS OF PROBLEM
58	I		AN IF STATEMENT MAY BE MORE EFFICIENT THAN A 2 OR 3 BRANCH COMPUTED GO TO STATEMENT.

SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS		DEF LINE	REFERENCES
3	SYMEIG	47	90

VARIABLES		SN	TYPE		RELOCATION						
0	A		REAL	ARRAY	F.P.	REFS	49	70	80	86	DEFINED 47
224	EPS		REAL			REFS	72	85	DEFINED	71	82
227	I		INTEGER			REFS	86	DEFINED	84		
0	INDEX		INTEGER		F.P.	REFS	72	DEFINED	47		
226	K		INTEGER			REFS	85	87	DEFINED	83	87

```
VARIABLES      SN  TYPE            RELOCATION
     O  KOUNT      INTEGER              F.P.       REFS      84   DEFINED     47
     O  KSYMEI     INTEGER              F.P.       REFS      58   DEFINED     47
   216  LD         INTEGER                         REFS      65      70       72       80       86
                                                DEFINED      64
   217  LO         INTEGER                         REFS      66      70       72       80       86
                                                DEFINED      65
     O  LOW        INTEGER              F.P.       REFS      83   DEFINED     47
   221  LP         INTEGER                         REFS      68      70       72       80       86
                                                DEFINED      67
   222  LQ         INTEGER                         REFS      69      80       86   DEFINED      68
   223  LR         INTEGER                         REFS      80      86   DEFINED      69
   220  LS         INTEGER                         REFS      67      70       72       80       81       86
                                                DEFINED      66
     O  M          INTEGER              F.P.       REFS      64      65       66       67       68       69       70
                                                     72      80      86   DEFINED      47
     O  MID        INTEGER              F.P.       REFS      50   DEFINED     47
     3  MINUS2     INTEGER             CVIBRA      REFS      52
     O  NUMBR      INTEGER              F.P.       REFS      72   DEFINED     47
     O  R          REAL        ARRAY    F.P.       REFS      49    4*70     5*72     6*80       81       85     6*86
                                                DEFINED      47
   225  ROOT       REAL                            REFS      80      82       85       86   DEFINED      81       85
     O  TOL        REAL                CVIBRA      REFS      52      71
     1  TOL1       REAL                CVIBRA      REFS      52      71
     2  TOL2       REAL                CVIBRA      REFS      52      82
     O  X          REAL        ARRAY    F.P.       REFS      50      80       86   DEFINED      47

EXTERNALS          TYPE   ARGS        REFERENCES
       QSVEC               11             80        86
       STURM                9             72
       TFORM                6             70

INLINE FUNCTIONS   TYPE   ARGS         DEF LINE   REFERENCES
       AMIN1      REAL     O  INTRIN                  71        85
       AMIN1F     REAL     2    SF         56         71        85

STATEMENT LABELS               DEF LINE   REFERENCES
   17  50                          59         58
   61  80                          75         58
    O  200                         87         84
  141  300                         89         73

LOOPS  LABEL     INDEX      FROM-TO     LENGTH     PROPERTIES
  111  200       I           84 87        30B                 EXT REFS

COMMON BLOCKS    LENGTH     MEMBERS - BIAS NAME(LENGTH)
       CVIBRA        4                O TOL     (1)                1 TOL1    (1)                 2 TOL2    (1)
                                      3 MINUS2 (1)

STATISTICS
  PROGRAM LENGTH                 244B      164
  CM LABELED COMMON LENGTH         4B        4
          52000B CM USED
```

```
C45700. SUB. TFORM                                                      TFORM   2
C                                                                       TFORM   3
C********************************************************************** TFORM   4
C                                                                     * TFORM   5
C***  SUBROUTINE        ********************************************** TFORM   6
C                                                                     * TFORM   7
C***  COMPUTER VERSION  ********************************************** TFORM   8
C     ----------------                                                * TFORM   9
C     IBM .... AS IS.                                                 * TFORM  10
C                                                                     * TFORM  11
C     CDC .... AS IS.                                                 * TFORM  12
C                                                                     * TFORM  13
C***  OBJECTIVE  ***************************************************** TFORM  14
C     ---------                                                       * TFORM  15
C     A LOWER TRIANGULAR MATRIX OF THE STANDARD EIGENVALUE PROBLEM IS * TFORM  16
C     REDUCED TO A TRI-DIAGONAL FORM USING THE HOUSEHOLDER METHOD.    * TFORM  17
C                                                                     * TFORM  18
C***  INPUT/OUTPUT  ************************************************** TFORM  19
C     ------------                                                    * TFORM  20
C                                                                     * TFORM  21
C***  SUMMARY OF SYMBOLS  ******************************************** TFORM  22
C     ------------------                                              * TFORM  23
C                                                                     * TFORM  24
C***  ERROR MESSAGES  ************************************************ TFORM  25
C     --------------                                                  * TFORM  26
C     NONE.                                                           * TFORM  27
C                                                                     * TFORM  28
C********************************************************************** TFORM  29
      SUBROUTINE TFORM(A,N,D,O,S,P)                                     TFORM  30
C                                                                       TFORM  31
      DIMENSION A(1),D(1),O(1),S(1)                                     TFORM  32
C                                                                       TFORM  33
C                                                                       TFORM  34
C FUNCTION DEFINITION                                                   TFORM  35
      AMAX1F(X,Y)    =  AMAX1(X,Y)                                      TFORM  36
      AMIN1F(X,Y)    =  AMIN1(X,Y)                                      TFORM  37
      SQRTF(X)       =  SQRT(X)                                         TFORM  38
C                                                                       TFORM  39
      BL = 0.                                                           TFORM  40
      BU = 0.                                                           TFORM  41
      OLD = 0.                                                          TFORM  42
      D(1) = A(1)                                                       TFORM  43
      K1K1 = 1                                                          TFORM  44
      N1 = N - 1                                                        TFORM  45
      DO 230  K = 1,N1                                                  TFORM  46
      KP1 = K + 1                                                       TFORM  47
      KK = K1K1                                                         TFORM  48
      KKP1 = KK + 1                                                     TFORM  49
      NK = N - K                                                        TFORM  50
      KN = KK + NK                                                      TFORM  51
      K1K1 = KN + 1                                                     TFORM  52
      SUM = 0.                                                          TFORM  53
      DO 100  KJ = KKP1,KN                                              TFORM  54
  100 SUM = SUM + A(KJ)*A(KJ)                                           TFORM  55
      S(K) = SUM                                                        TFORM  56
      RHO = SQRTF(SUM)                                                  TFORM  57
      RAD = OLD + RHO                                                   TFORM  58
```

```
          BL = AMIN1F(BL,D(K)-RAD)                                          TFORM     59
          BU = AMAX1F(BU,D(K)+RAD)                                          TFORM     60
          IF (K - N1) 120,230,230                                           TFORM     61
      120 OLD = RHO                                                         TFORM     62
          IF (A(KKP1)) 140,140,130                                          TFORM     63
      130 RHO = -RHO                                                        TFORM     64
      140 O(K) = RHO                                                        TFORM     65
          IF (SUM) 150,230,150                                              TFORM     66
      150 A(KKP1) = A(KKP1) - RHO                                           TFORM     67
          RHO =  1. / (RHO*A(KKP1))                                         TFORM     68
          A(KK) = RHO                                                       TFORM     69
          IJ = KK                                                           TFORM     70
          DO 160  J = KP1,N                                                 TFORM     71
          IJ = IJ + 1                                                       TFORM     72
          O(J) = A(IJ)                                                      TFORM     73
      160 D(J) = O.                                                         TFORM     74
          II = K1K1                                                         TFORM     75
          NI = NK                                                           TFORM     76
          DO 190  I = KP1,N                                                 TFORM     77
          D(I) = D(I) + A(II)*O(I)                                          TFORM     78
          IJ = II                                                           TFORM     79
          II = II + NI                                                      TFORM     80
          NI = NI - 1                                                       TFORM     81
          IF (NI) 170,190,170                                               TFORM     82
      170 X = O(I)                                                          TFORM     83
          DO 180  J = I,N1                                                  TFORM     84
          IJ = IJ + 1                                                       TFORM     85
          D(J+1) = D(J+1) + A(IJ)*X                                         TFORM     86
      180 D(I) = D(I) + A(IJ)*O(J+1)                                        TFORM     87
      190 D(I) = D(I) * RHO                                                 TFORM     88
          SUM = O.                                                          TFORM     89
          DO 200  I = KP1,N                                                 TFORM     90
      200 SUM = SUM + D(I)*O(I)                                             TFORM     91
          TAU = RHO * SUM * .5                                              TFORM     92
          DO 210  I = KP1,N                                                 TFORM     93
      210 D(I) = D(I) + TAU*O(I)                                            TFORM     94
          II = K1K1                                                         TFORM     95
          NI = NK                                                           TFORM     96
          DO 220  I = KP1,N                                                 TFORM     97
          RHO = D(I)                                                        TFORM     98
          TAU = O(I)                                                        TFORM     99
          IJ = II                                                           TFORM    100
          II = II + NI                                                      TFORM    101
          NI = NI - 1                                                       TFORM    102
          DO 220  J = I,N                                                   TFORM    103
          A(IJ) = A(IJ) + RHO*O(J) + TAU*D(J)                               TFORM    104
      220 IJ = IJ + 1                                                       TFORM    105
      230 D(K+1) = A(K1K1)                                                  TFORM    106
          O(N1) = A(KKP1)                                                   TFORM    107
          O(N) = AMIN1F(BL,D(N)-RHO)                                        TFORM    108
          S(N) = AMAX1F(BU,D(N)+RHO)                                        TFORM    109
C                                                                           TFORM    110
          RETURN                                                            TFORM    111
          END                                                               TFORM    112
```

```
SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS      DEF LINE     REFERENCES
  3  TFORM           29          110

VARIABLES      SN  TYPE           RELOCATION
   0  A            REAL     ARRAY      F.P.    REFS        31       42     2*54       62       66       67       72
                                                  77       85       86      103      105      106
                                             DEFINED       29       66       68      103
 233  BL           REAL                          REFS       58      107  DEFINED       39       58
 234  BU           REAL                          REFS       59      108  DEFINED       40       59
   0  D            REAL     ARRAY      F.P.    REFS        31       58       59       77       85       86       87
                                                  90       93       97      103      107      108
                                             DEFINED       29       42       73       77       85       86       87
                                                  93      105
 256  I            INTEGER                       REFS     3*77       82       83     2*86     2*87     2*90     3*93
                                                  97       98      102  DEFINED       76       89       92       96
 254  II           INTEGER                       REFS       77       78       79       99      100
                                             DEFINED       74       79       94      100
 252  IJ           INTEGER                       REFS       71       72       84       85       86    2*103      104
                                             DEFINED       69       71       78       84       99      104
 253  J            INTEGER                       REFS       72       73     2*85       86    2*103
                                             DEFINED       70       83      102
 240  K            INTEGER                       REFS       46       49       55       58       59       60       64
                                                 105  DEFINED       45
 247  KJ           INTEGER                       REFS     2*54  DEFINED       53
 242  KK           INTEGER                       REFS       48       50       68       69  DEFINED       47
 243  KKP1         INTEGER                       REFS       53       62     2*66       67      106
                                             DEFINED       48
 245  KN           INTEGER                       REFS       51       53  DEFINED       50
 241  KP1          INTEGER                       REFS       70       76       89       92       96
                                             DEFINED       46
 236  K1K1         INTEGER                       REFS       47       74       94      105  DEFINED       43       51
   0  N            INTEGER             F.P.    REFS        44       49       70       76       89       92       96
                                                 102    2*107    2*108  DEFINED       29
 255  NI           INTEGER                       REFS       79       80       81      100      101
                                             DEFINED       75       80       95      101
 244  NK           INTEGER                       REFS       50       75       95  DEFINED       49
 237  N1           INTEGER                       REFS       45       60       83      106  DEFINED       44
   0  O            REAL     ARRAY      F.P.    REFS        31       77       82       86       90       93       98
                                                 103  DEFINED       29       64       72      106      107
 235  OLD          REAL                          REFS       57  DEFINED       41       61
   0  P            REAL     *UNUSED    F.P.  DEFINED       29
 251  RAD          REAL                          REFS       58       59  DEFINED       57
 250  RHO          REAL                          REFS       57       61       63       64       66       67       68
                                                  87       91      103      107      108  DEFINED       56       63
                                                  67       97
   0  S            REAL     ARRAY      F.P.    REFS        31  DEFINED       29       55      108
 246  SUM          REAL                          REFS       54       55       56       65       90       91
                                             DEFINED       52       54       88       90
 260  TAU          REAL                          REFS       93      103  DEFINED       91       98
 257  X            REAL                          REFS       85  DEFINED       82

EXTERNALS           TYPE    ARGS        REFERENCES
      SQRT          REAL      1 LIBRARY      56
```

```
INLINE FUNCTIONS   TYPE   ARGS        DEF LINE  REFERENCES
       AMAX1       REAL     0  INTRIN                59       108
       AMAX1F      REAL     2    SF        35        59       108
       AMIN1       REAL     0  INTRIN                58       107
       AMIN1F      REAL     2    SF        36        58       107
       SQRTF       REAL     1    SF        37        56

STATEMENT LABELS              DEF LINE   REFERENCES
    0  100                        54         53
    0  120         INACTIVE       61         60
    0  130         INACTIVE       63         62
   53  140                        64         2*62
    0  150         INACTIVE       66         2*65
    0  160                        73         70
    0  170         INACTIVE       82         2*81
    0  180                        86         83
  126  190                        87         76         81
    0  200                        90         89
    0  210                        93         92
    0  220                       104         96        102
  207  230                       105         45        2*60       65

LOOPS  LABEL     INDEX       FROM-TO     LENGTH     PROPERTIES
   15  230       K             45 105      177B               EXT REFS  NOT INNER
   27  100       KJ            53 54         3B     INSTACK
   71  160       J             70 73         3B     INSTACK
  101  190       I             76 87        31B               NOT INNER
  117  180       J             83 86         6B     INSTACK
  137  200       I             89 90         4B     INSTACK
  152  210       I             92 93         3B     INSTACK
  162  220       I             96 104       25B               NOT INNER
  176  220       J            102 104        5B     INSTACK

STATISTICS
  PROGRAM LENGTH                326B      214
        52000B CM USED
```

```
      C45700, SUB. STURM                                                   STURM      2
      C                                                                    STURM      3
      C******************************************************************** STURM      4
      C                                                                  * STURM      5
      C***  SUBROUTINE        ******************************************** STURM      6
      C                                                                  * STURM      7
      C***  COMPUTER VERSION  ******************************************** STURM      8
      C     ----------------                                             * STURM      9
      C     IBM .... AS IS.                                              * STURM     10
      C                                                                  * STURM     11
      C     CDC .... AS IS.                                              * STURM     12
      C                                                                  * STURM     13
      C***  OBJECTIVE  *************************************************** STURM     14
      C     ---------                                                    * STURM     15
      C     APPLY BISECTION TECHNIQUE FOR THE ROOTS                      * STURM     16
      C                                                                  * STURM     17
      C***  INPUT/OUTPUT  ************************************************ STURM     18
      C     ------------                                                 * STURM     19
      C                                                                  * STURM     20
      C***  SUMMARY OF SYMBOLS  ****************************************** STURM     21
      C     ------------------                                           * STURM     22
      C                                                                  * STURM     23
      C***  ERROR MESSAGES  ********************************************** STURM     24
      C     --------------                                               * STURM     25
      C     NONE.                                                        * STURM     26
      C                                                                  * STURM     27
      C******************************************************************** STURM     28
            SUBROUTINE STURM (N,LIM1,NUMB,D,OFFD,SEC,PFFD,SIGMA,EPS)       STURM     29
      C                                                                    STURM     30
            DIMENSION D(1),OFFD(1),SEC(1),SIGMA(1),PFFD(1)                 STURM     31
      C                                                                    STURM     32
      C                                                                    STURM     33
      C FUNCTION DEFINITION                                                 STURM     34
            ABSF(X)        =  ABS(X)                                       STURM     35
            AMAX1F(X,Y)    =  AMAX1(X,Y)                                   STURM     36
      C                                                                    STURM     37
            DATA HALF / .5/                                                STURM     38
      C                                                                    STURM     39
            BL = OFFD(N)                                                   STURM     40
            BU = SEC(N)                                                    STURM     41
            LIM2 = LIM1 + NUMB - 1                                         STURM     42
            CALL PREP(N,D,SEC,ROOT,LORD,1)                                 STURM     43
            N1 = N - 1                                                     STURM     44
            IF (N1) 16,200,200                                             STURM     45
        200 TOL = AMAX1F(-BL,BU)                                           STURM     46
            OFFD(N) = TOL                                                  STURM     47
            TOL = TOL * AMAX1F(1.E-15,EPS)                                 STURM     48
            DO 2  I = LIM1,LIM2                                            STURM     49
            SIGMA(I) = BL                                                  STURM     50
          2 PFFD(I) = BU                                                   STURM     51
            LORD = 0                                                       STURM     52
            L = LIM1 - 1                                                   STURM     53
            RUTE = 1.E20                                                   STURM     54
            GO TO 3                                                        STURM     55
        300 DO 400  I = K,L                                                STURM     56
        400 SIGMA(I) = ROOT                                                STURM     57
          3 K = L + 1                                                      STURM     58
```

```
          IF (K - LIM2) 4,4,16                                                  STURM        59
        4 BU = PFFD(K)                                                          STURM        60
          ROOT = BU  +  HALF * (SIGMA(K) - BU)                                  STURM        61
          IF (K - L) 5,7,5                                                      STURM        62
        5 DO 6  I = K,LIM2                                                      STURM        63
          IF (BU - PFFD(I)) 7,6,7                                               STURM        64
        6 L = I                                                                 STURM        65
        7 IF (ABSF(ROOT - RUTE) - TOL) 300,300,8                                STURM        66
        8 CALL PREP(N,D,SEC,ROOT,LORD,2)                                        STURM        67
          DO 11  I = K,L                                                        STURM        68
          IF(I -LORD) 9,9,10                                                    STURM        69
        9 SIGMA(I) = ROOT                                                       STURM        70
          GO TO 11                                                              STURM        71
       10 PFFD(I) = ROOT                                                        STURM        72
       11 CONTINUE                                                              STURM        73
          RUTE = ROOT                                                           STURM        74
          GO TO 4                                                               STURM        75
C                                                                               STURM        76
       16 RETURN                                                                STURM        77
          END                                                                   STURM        78
```

```
     SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS      DEF LINE     REFERENCES
    3  STURM         28          76

VARIABLES       SN  TYPE            RELOCATION
   161  BL          REAL                          REFS        45        49   DEFINED        39
   162  BU          REAL                          REFS        45        50      2*60        63   DEFINED        40        59
     0  D           REAL        ARRAY     F.P.    REFS        30        42        66   DEFINED        28
     0  EPS         REAL                  F.P.    REFS        47   DEFINED        28
   154  HALF        REAL                          REFS        60   DEFINED        37
   170  I           INTEGER                       REFS        49        50        56        63        64        68        69
                                                    71   DEFINED        48        55        62        67
   173  K           INTEGER                       REFS        55        58        59        60        61        62        67
                                               DEFINED        57
   171  L           INTEGER                       REFS        55        57        61        67   DEFINED        52        64
     0  LIM1        INTEGER               F.P.    REFS        41        48        52   DEFINED        28
   163  LIM2        INTEGER                       REFS        48        58        62   DEFINED        41
   165  LORD        INTEGER                       REFS        42        66        68   DEFINED        51
     0  N           INTEGER               F.P.    REFS        39        40        42        43        46        66
                                               DEFINED        28
     0  NUMB        INTEGER               F.P.    REFS        41   DEFINED        28
   166  N1          INTEGER                       REFS        44   DEFINED        43
     0  OFFD        REAL        ARRAY     F.P.    REFS        30        39   DEFINED        28        46
     0  PFFD        REAL        ARRAY     F.P.    REFS        30        59        63   DEFINED        28        50        71
   164  ROOT        REAL                          REFS        42        56        65        66        69        71        73
                                               DEFINED        60
   172  RUTE        REAL                          REFS        65   DEFINED        53        73
     0  SEC         REAL        ARRAY     F.P.    REFS        30        40        42        66   DEFINED        28
     0  SIGMA       REAL        ARRAY     F.P.    REFS        30        60   DEFINED        28        49        56        69
   167  TOL         REAL                          REFS        46        47        65   DEFINED        45        47
```

```
EXTERNALS          TYPE   ARGS        REFERENCES
      PREP                  6              42        66

INLINE FUNCTIONS    TYPE   ARGS         DEF LINE   REFERENCES
      ABS          REAL       1  INTRIN                 65
      ABSF         REAL       1    SF        34         65
      AMAX1        REAL       0  INTRIN                 45        47
      AMAX1F       REAL       2    SF        35         45        47

STATEMENT LABELS                DEF LINE   REFERENCES
    0  2                           50         48
   62  3                           57         54
   66  4                           59         2*58      74
    0  5           INACTIVE        62         2*61
    0  6                           64         62        63
  105  7                           65         61        2*63
    0  8           INACTIVE        66         65
    0  9           INACTIVE        69         2*68
  130  10                          71         68
  131  11                          72         67        70
  135  16                          76         44        58
    0  200         INACTIVE        45         2*44
   53  300                         55         2*65
    0  400                         56         55

LOOPS  LABEL    INDEX      FROM-TO    LENGTH   PROPERTIES
   42  2        I           48 50        3B     INSTACK
   57  400      I           55 56        2B     INSTACK
   77  6        I           62 64        6B     INSTACK     EXITS
  124  11       I           67 72        6B     INSTACK

STATISTICS
  PROGRAM LENGTH                 176B      126
       52000B CM USED
```

```
C45700, SUB. PREP                                                        PREP     2
C                                                                        PREP     3
C*********************************************************************** PREP     4
C                                                                      * PREP     5
C***   SUBROUTINE        ********************************************** PREP     6
C                                                                      * PREP     7
C***   COMPUTER VERSION  ********************************************** PREP     8
C      ----------------                                                * PREP     9
C      IBM .... AS IS.                                                 * PREP    10
C                                                                      * PREP    11
C      CDC .... AS IS.                                                 * PREP    12
C                                                                      * PREP    13
C***   OBJECTIVE  ***************************************************** PREP    14
C      ---------                                                       * PREP    15
C      PROVIDE PROGRAM STURM WITH CRITICAL INFORMATION FOR THE LOCATION * PREP    16
C      AND NUMBER OF ROOTS.  THE PROCEDURE IS TO CHOOSE A TRIAL VALUE   * PREP    17
C      FOR THE ROOT, LOCATE THE NUMBER OF ROOTS ABOVE THIS VALUE, AND   * PREP    18
C      THEN USING AN ITERATIVE PROCESS LOCATE THE NEXT ROOT.            * PREP    19
C                                                                      * PREP    20
C***   INPUT/OUTPUT  ************************************************** PREP    21
C      ------------                                                    * PREP    22
C                                                                      * PREP    23
C***   SUMMARY OF SYMBOLS  ******************************************** PREP    24
C      ------------------                                              * PREP    25
C                                                                      * PREP    26
C***   ERROR MESSAGES  ************************************************ PREP    27
C      --------------                                                  * PREP    28
C      NONE.                                                           * PREP    29
C                                                                      * PREP    30
C*********************************************************************** PREP    31
      SUBROUTINE PREP(N,D,SEC,ROOT,LORD,KPREP)                           PREP    32
C                                                                        PREP    33
      DIMENSION D(1),SEC(1)                                              PREP    34
C                                                                        PREP    35
      EQUIVALENCE (RD2,RE2),(RD4,RE4)                                    PREP    36
C                                                                        PREP    37
      GO TO (50,80), KPREP                                               PREP    38
   50 CONTINUE                                                           PREP    39
      N1 = N - 1                                                         PREP    40
      GO TO 200                                                          PREP    41
   80 CONTINUE                                                           PREP    42
      RDO = ROOT                                                         PREP    43
      LOW = 0                                                            PREP    44
      LAWD = 0                                                           PREP    45
  100 RD2 = 0.0                                                          PREP    46
      RD4 = 1.0                                                          PREP    47
      DO 120  I = LOW,N1                                                 PREP    48
      RD4 = D(I+1) - RDO - RD2                                           PREP    49
      IF (RD4) 120,140,110                                               PREP    50
  110 LAWD = LAWD + 1                                                    PREP    51
  120 RE2 = SEC(I+1) / RE4                                               PREP    52
  130 LORD = LAWD                                                        PREP    53
      GO TO 200                                                          PREP    54
  140 LAWD = LAWD + 1                                                    PREP    55
      IF (RE2) 150,160,150                                               PREP    56
  150 I = I + 1                                                          PREP    57
  160 LOW = I + 1                                                        PREP    58
```

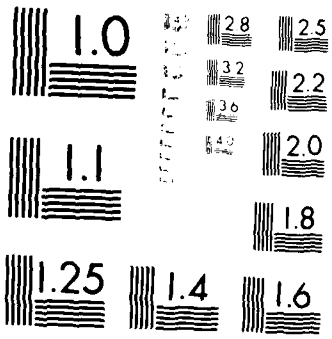
```
                    IF (LOW - N1) 100,100,130                                                 PREP        59
                C                                                                             PREP        60
      60          200 RETURN                                                                  PREP        61
                    END                                                                       PREP        62



 CARD NR. SEVERITY  DETAILS    DIAGNOSIS OF PROBLEM

      37     I                AN IF STATEMENT MAY BE MORE EFFICIENT THAN A 2 OR 3 BRANCH COMPUTED GO TO STATEMENT.



        SYMBOLIC REFERENCE MAP (R=3)

 ENTRY POINTS      DEF LINE      REFERENCES
     3  PREP          31           60

 VARIABLES       SN  TYPE            RELOCATION
     0  D             REAL        ARRAY    F.P.          REFS        33        48    DEFINED        31
    62  I             INTEGER                            REFS        48        51         56        57    DEFINED        47        56
     0  KPREP         INTEGER              F.P.          REFS        37   DEFINED         31
    61  LAWD          INTEGER                            REFS        50        52         54   DEFINED         44        50        54
     0  LORD          INTEGER              F.P.       DEFINED        31        52
    60  LOW           INTEGER                            REFS        47        58    DEFINED        43        57
     0  N             INTEGER              F.P.          REFS        39   DEFINED         31
    56  N1            INTEGER                            REFS        47        58    DEFINED        39
    57  RDO           REAL                               REFS        48   DEFINED         42
    63  RD2           REAL                               REFS        35        48    DEFINED        45
    64  RD4           REAL                               REFS        35        49    DEFINED        46        48
    63  RE2           REAL                               REFS        35        55    DEFINED        51
    64  RE4           REAL                               REFS        35        51
     0  ROOT          REAL                 F.P.          REFS        42   DEFINED         31
     0  SEC           REAL        ARRAY    F.P.          REFS        33        51    DEFINED        31

 STATEMENT LABELS              DEF LINE    REFERENCES
    15  50                        38          37
    20  80                        41          37
    23  100                       45          2*58
     0  110       INACTIVE        50          49
    35  120                       51          47        49
    42  130                       52          58
    44  140                       54          49
     0  150       INACTIVE        56          2*55
    50  160                       57          55
    54  200                       60          40        53

 LOOPS  LABEL    INDEX      FROM-TO    LENGTH    PROPERTIES
    27  120      I           47 51       13B         OPT      EXITS

 EQUIV CLASSES   LENGTH      MEMBERS - BIAS NAME(LENGTH)
        RD2          1                O RE2     (1)
        RD4          1                O RE4     (1)
```

```
STATISTICS
  PROGRAM LENGTH              70B      56
        52000B CM USED
```

```
C45700, SUB. QSVEC                                                      QSVEC     2
C                                                                       QSVEC     3
C*********************************************************************** QSVEC     4
C                                                                     * QSVEC     5
C***  SUBROUTINE         ********************************************** QSVEC     6
C                                                                     * QSVEC     7
C***  COMPUTER VERSION  *********************************************** QSVEC     8
C     ----------------                                                * QSVEC     9
C     IBM .... INCLUDES DOUBLE PRECISION TYPE STATEMENTS.  COLUMN ONE * QSVEC    10
C              SHOULD BE BLANK.                                       * QSVEC    11
C                                                                     * QSVEC    12
C     CDC .... DOES NOT INCLUDE DOUBLE PRECISION TYPE STATEMENTS.     * QSVEC    13
C              THESE STATEMENTS ARE CONVERTED INTO COMMENTS BY        * QSVEC    14
C              INSERTING THE LETTER C IN COLUMN ONE.                  * QSVEC    15
C                                                                     * QSVEC    16
C***  OBJECTIVE  ****************************************************** QSVEC    17
C     ---------                                                       * QSVEC    18
C  SYMMETRIC MATRIX EIGENVECTOR CALCULATION.                              QSVEC    19
C  GIVEN THE ENTRIES (D AND OFFD) OF THE HOUSEHOLDER TRI-DIAGONAL FORM B QSVEC    20
C    OF A REAL SYMMETRIC MATRIX A, AND GIVEN A GOOD APPROXIMATE ROOT OF  QSVEC    21
C    B (AND A) THIS FORTRAN 4 SUBROUTINE COMPUTES A UNIT EIGENVECTOR X   QSVEC    22
C    OF B, THEN TRANSFORMS IT TO A UNIT VECTOR OF A, USING THE VECTORS W QSVEC    23
C    STORED IN THE A ARRAY.                                              QSVEC    24
C                                                                     * QSVEC    25
C***  INPUT/OUTPUT  *************************************************** QSVEC    26
C     ------------                                                    * QSVEC    27
C                                                                     * QSVEC    28
C***  SUMMARY OF SYMBOLS  ********************************************* QSVEC    29
C     ------------------                                              * QSVEC    30
C                                                                     * QSVEC    31
C***  ERROR MESSAGES  ************************************************* QSVEC    32
C     --------------                                                  * QSVEC    33
C     NONE.                                                           * QSVEC    34
C                                                                     * QSVEC    35
C*********************************************************************** QSVEC    36
C                                                                        QSVEC    37
      SUBROUTINE QSVEC(A,D,OFFD,P,Q,R,S,N,ROOT,X,KQSVEC)                 QSVEC    38
C                                                                        QSVEC    39
C                                                                        QSVEC    40
CIBM  BEGINNING OF TYPE STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS QSVEC    41
C     DOUBLE PRECISION SUM                                               QSVEC    42
CIBM  ENDING OF TYPE STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS    QSVEC    43
C                                                                        QSVEC    44
      DIMENSION A(1),D(1),OFFD(1),P(1),Q(1),R(1),S(1),X(1)               QSVEC    45
C                                                                        QSVEC    46
      COMMON /INFO/ SUM,M,IX,IA                                          QSVEC    47
      COMMON /CVIBRA/ TOLO  ,TOL1  ,TOL2  ,MINUS2                        QSVEC    48
C                                                                        QSVEC    49
C                                                                        QSVEC    50
C FUNCTION DEFINITION                                                    QSVEC    51
      ABSF(X)       =  ABS(X)                                            QSVEC    52
      AMAX1F(X,Y)   =  AMAX1(X,Y)                                        QSVEC    53
      SQRTF(X)      =  SQRT(X)                                           QSVEC    54
C                                                                        QSVEC    55
      GO TO (50,80), KQSVEC                                              QSVEC    56
C                                                                        QSVEC    57
C                                                                        QSVEC    58
```

AD-A152 270 ESP (EXTERNAL-STORES PROGRAM) - A PILOT COMPUTER PROGRAM FOR DETERMINING..(U) GRUMMAN AEROSPACE CORP BETHPAGE NY J B SNEDFJELD FEB 85 ADCR-85-1-VOL-3-PT-1 5/8

UNCLASSIFIED N00019-81-C-0395 F/G 9/2 NL



MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

```
C  PART 1.  PRELIMINARIES.
C
   50 CONTINUE
      IX = 1
      IA = 1
      N1 = N - 1
      N2 = N - 2
      GO TO 370
C
   80 CONTINUE
      ASSIGN 170 TO KOUNT
      TOL = O.
      DO 100  I = 1,N
      P(I) = D(I) - ROOT
      Q(I) = OFFD(I)
      R(I) = O.
      TOL = AMAX1F(TOL,ABSF(D(I)))
  100 X(I) = RDM(X) + .1
      TOL = (TOL + 1.E-15) * 1.E-15
C
C  PART 2.  MATRIX DECOMPOSITION.
C
      DO 150  I = 1,N1
      T = ABSF(P(I))
      U = ABSF(OFFD(I))
      IF (T + U - TOL) 110,120,120
  110 P(I) = TOL
      T = P(I)
  120 IF (T - U) 130,140,140
  130 S(I) = P(I)/OFFD(I)
      S(I) = ANDOR(S(I),1,1)
      TEMP = Q(I)
      P(I) = OFFD(I)
      Q(I) = P(I+1)
      R(I) = Q(I+1)
      P(I+1) = TEMP - S(I)*Q(I)
      Q(I+1) = -S(I)*R(I)
      GO TO 150
  140 S(I) = OFFD(I)/P(I)
      S(I) =  ANDOR(S(I),MINUS2,O)
      P(I+1) = P(I+1) - S(I)*Q(I)
  150 CONTINUE
      IF (ABSF(P(N)) .LT. TOL)  P(N) = TOL
      GO TO 210
C
C  PART 3.  RIGHT SIDE MODIFICATION.
C
  170 ASSIGN 330 TO KOUNT
      DO 200  I = 1,N1
      TEMP = ANDOR(S(I),1,O)
      IF (TEMP) 180,190,180
  180 T = X(I)
      X(I) = X(I+1)
      X(I+1) = T - S(I)*X(I)
      GO TO 200
  190 X(I+1) = X(I+1) - S(I)*X(I)
  200 CONTINUE
```

```
      C                                                                   QSVEC     116
      C  PART 4.  TRIANGULAR SYSTEM SOLUTION.                             QSVEC     117
      C                                                                   QSVEC     118
        210 X(N) = X(N)/P(N)                                              QSVEC     119
            X(N1) = (X(N1) - Q(N1)*X(N)) / P(N1)                          QSVEC     120
            DO 220  I = 2,N1                                              QSVEC     121
            K = N - I                                                     QSVEC     122
        220 X(K) = (X(K) - Q(K)*X(K+1) - R(K)*X(K+2)) / P(K)              QSVEC     123
      C                                                                   QSVEC     124
      C  PART 5. SCALING TO UNIT VECTOR.                                  QSVEC     125
      C                                                                   QSVEC     126
        230 SUM = 0.E0                                                    QSVEC     127
            M = N                                                         QSVEC     128
            SCALAR = SQRTF(DOTPRO(X,X))                                   QSVEC     129
            DO 250  I = 1,N                                               QSVEC     130
        250 X(I) = X(I)/SCALAR                                            QSVEC     131
            GO TO KOUNT, (170,330,370)                                    QSVEC     132
      C                                                                   QSVEC     133
      C  PART 6.  TRANSFORMATION BY ORTHOGONAL MATRICES.                  QSVEC     134
      C                                                                   QSVEC     135
        330 L = (N*(N+1))/2 - 4                                           QSVEC     136
            DO 360  I = 1,N2                                              QSVEC     137
            NI = N - I                                                    QSVEC     138
            SUM = 0.E0                                                    QSVEC     139
            M = I + 1                                                     QSVEC     140
            SCALAR =  A(L-1) * DOTPRO(X(NI),A(L))                         QSVEC     141
            IJ = L                                                        QSVEC     142
            DO 350  J = NI,N                                              QSVEC     143
            X(J) = X(J) + SCALAR*A(IJ)                                    QSVEC     144
        350 IJ = IJ + 1                                                   QSVEC     145
        360 L = L - I - 3                                                 QSVEC     146
            ASSIGN 370 TO KOUNT                                           QSVEC     147
            GO TO 230                                                     QSVEC     148
      C                                                                   QSVEC     149
        370 RETURN                                                        QSVEC     150
            END                                                           QSVEC     151
```

CARD NR. SEVERITY DETAILS DIAGNOSIS OF PROBLEM

CARD NR.	SEVERITY	DETAILS	DIAGNOSIS OF PROBLEM
55	I		AN IF STATEMENT MAY BE MORE EFFICIENT THAN A 2 OR 3 BRANCH COMPUTED GO TO STATEMENT.

SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS	DEF LINE	REFERENCES
3 QSVEC	37	149

VARIABLES	SN	TYPE		RELOCATION								
0 A		REAL	ARRAY	F.P.	REFS	44	2*140	143	DEFINED	37		
0 D		REAL	ARRAY	F.P.	REFS	44	71	74	DEFINED	37		
304 I		INTEGER			REFS	2*71	2*72	73	74	75	81	82

```
VARIABLES     SN  TYPE           RELOCATION
                                              84       85     3*87     2*88       89     2*90     2*91     2*92
                                            3*93     3*94     3*96     2*97     4*98      107      109    2*110
                                           3*111    4*113      121    2*130      137      139      145
                                         DEFINED       70       80      106      120      129      136
    3  IA        INTEGER          INFO      REFS       46  DEFINED       62
  314  IJ        INTEGER                    REFS      143      144  DEFINED      141      144
    2  IX        INTEGER          INFO      REFS       46  DEFINED       61
  315  J         INTEGER                    REFS    2*143  DEFINED      142
  310  K         INTEGER                    REFS    7*122  DEFINED      121
  302  KOUNT     INTEGER                    REFS      131  DEFINED       68      105      146
    0  KQSVEC    INTEGER          F.P.      REFS       55  DEFINED       37
  312  L         INTEGER                    REFS    2*140      141      145  DEFINED      135      145
    1  M         INTEGER          INFO      REFS       46  DEFINED      127      139
    3  MINUS2    INTEGER          CVIBRA    REFS       47       97
    0  N         INTEGER          F.P.      REFS       63       64       70    2*100    3*118      119      121
                                             127      129    2*135      137      142  DEFINED       37
  313  NI        INTEGER                    REFS      140      142  DEFINED      137
  300  N1        INTEGER                    REFS       80      106    4*119      120  DEFINED       63
  301  N2        INTEGER                    REFS      136  DEFINED       64
    0  OFFD      REAL      ARRAY  F.P.      REFS       44       72       82       87       90       96
                                         DEFINED       37
    0  P         REAL      ARRAY  F.P.      REFS       44       81       85       87       91       96       98
                                             100      118      119      122  DEFINED       37       71       84
                                              90       93       98      100
    0  Q         REAL      ARRAY  F.P.      REFS       44       89       92       93       98      119      122
                                         DEFINED       37       72       91       94
    0  R         REAL      ARRAY  F.P.      REFS       44       94      122  DEFINED       37       73       92
    0  ROOT      REAL             F.P.      REFS       71  DEFINED       37
    0  S         REAL      ARRAY  F.P.      REFS       44       88       93       94       97       98      107
                                             111      113  DEFINED       37       87       88       96       97
  311  SCALAR    REAL                       REFS      130      143  DEFINED      128      140
    0  SUM       REAL             INFO      REFS       46  DEFINED      126      138
  305  T         REAL                       REFS       83       86      111  DEFINED       81       85      109
  307  TEMP      REAL                       REFS       93      108  DEFINED       89      107
  303  TOL       REAL                       REFS       74       76       83       84    2*100
                                         DEFINED       69       74       76
    0  TOLO      REAL             CVIBRA    REFS       47
    1  TOL1      REAL             CVIBRA    REFS       47
    2  TOL2      REAL             CVIBRA    REFS       47
  306  U         REAL                       REFS       83       86  DEFINED       82
    0  X         REAL      ARRAY  F.P.      REFS       44       75      109      110      111    2*113      118
                                           2*119    3*122    2*128      130      140      143
                                         DEFINED       37       75      110      111      113      118      119
                                             122      130      143

EXTERNALS          TYPE    ARGS        REFERENCES
       ANDOR       REAL     3               88       97      107
       DOTPRO      REAL     2              128      140
       RDM         REAL     1               75
       SQRT        REAL     1 LIBRARY      128

INLINE FUNCTIONS   TYPE    ARGS        DEF LINE  REFERENCES
       ABS         REAL     1  INTRIN               74       81       82      100
       ABSF        REAL     1    SF        51       74       81       82      100
       AMAX1       REAL     0  INTRIN               74
       AMAX1F      REAL     2    SF        52       74
       SQRTF       REAL     1    SF        53      128
```

```
STATEMENT LABELS                DEF LINE   REFERENCES
   15  50                          60         55
   22  80                          67         55
    0  100                         75         70
    0  110          INACTIVE       84         83
   56  120                         86        2*83
    0  130          INACTIVE       87         86
   76  140                         96        2*86
  106  150                         99         80        95
  117  170                        105         68       131
    0  180          INACTIVE      109        2*108
  132  190                        113        108
  136  200                        114        106       112
  141  210                        118        101
    0  220                        122        120
  171  230                        126        147
    0  250                        130        129
  212  330                        135        105       131
    0  350                        144        142
    0  360                        145        136
  251  370                        149         65       131       146

LOOPS  LABEL    INDEX     FROM-TO    LENGTH    PROPERTIES
   25  100      I          70  75      17B               EXT REFS
   47  150      I          80  99      42B               EXT REFS
  121  200      I         106 114      20B               EXT REFS
  161  220      I         120 122       7B      INSTACK
  205  250      I         129 130       3B      INSTACK
  216  360      I         136 145      31B               EXT REFS  NOT INNER
  236  350      J         142 144       3B      INSTACK

COMMON BLOCKS   LENGTH     MEMBERS - BIAS NAME(LENGTH)
       INFO          4               0 SUM    (1)              1 M      (1)                2 IX     (1)
                                     3 IA     (1)
       CVIBRA        4               0 TOLO   (1)              1 TOL1   (1)                2 TOL2   (1)
                                     3 MINUS2 (1)

STATISTICS
  PROGRAM LENGTH                  370B     248
  CM LABELED COMMON LENGTH        10B        8
          52000B CM USED
```

```
C45700. SUB. SWAP                                                       SWAP       2
C                                                                       SWAP       3
C*********************************************************************** SWAP       4
C                                                                     * SWAP       5
C***  SUBROUTINE SWAP    ********************************************** SWAP       6
C                                                                     * SWAP       7
C***  COMPUTER VERSION  *********************************************** SWAP       8
C     ----------------                                                * SWAP       9
C     IBM .... AS IS.                                                 * SWAP      10
C                                                                     * SWAP      11
C     CDC .... AS IS.                                                 * SWAP      12
C                                                                     * SWAP      13
C***  OBJECTIVE  ****************************************************** SWAP      14
C     ---------                                                       * SWAP      15
C     A LOWER TRIANGULAR MATRIX STORED IN ROW SORT IN A SINGLE ARRAY  * SWAP      16
C     IS SWITHED TO A COLUMN SORT.                                    * SWAP      17
C                                                                     * SWAP      18
C***  INPUT/OUTPUT  *************************************************** SWAP      19
C     ------------                                                    * SWAP      20
C                                                                     * SWAP      21
C***  SUMMARY OF SYMBOLS  ********************************************* SWAP      22
C     ------------------                                              * SWAP      23
C                                                                     * SWAP      24
C***  ERROR MESSAGES  ************************************************* SWAP      25
C     --------------                                                  * SWAP      26
C     NONE.                                                           * SWAP      27
C                                                                     * SWAP      28
C*********************************************************************** SWAP      29
      SUBROUTINE SWAP   (A,M)                                           SWAP      30
C                                                                       SWAP      31
      DIMENSION A(1)                                                    SWAP      32
C                                                                       SWAP      33
C                                                                       SWAP      34
C FUNCTION DEFINITION                                                   SWAP      35
      IABSF(I)      =  IABS(I)                                          SWAP      36
C                                                                       SWAP      37
      N = IABSF(M)                                                      SWAP      38
      IF (N - 2) 190,190,90                                             SWAP      39
   90 L = (N*(N+1)) / 2                                                 SWAP      40
      KEY = 1                                                           SWAP      41
      LOCK = N/2 + 1                                                    SWAP      42
      IF (M) 100,190,160                                                SWAP      43
  100 IF (N - 3) 110,140,110                                            SWAP      44
  110 KKT = 3                                                           SWAP      45
      NKF = N - 1                                                       SWAP      46
      IMAGE = L                                                         SWAP      47
      INTO = L - 3                                                      SWAP      48
      I = 3                                                             SWAP      49
      DO 130  K = 2,LOCK                                                SWAP      50
      DO 120  IK = KKT,NKF                                              SWAP      51
      X = A(IK)                                                         SWAP      52
      A(IK) = A(INTO)                                                   SWAP      53
      A(INTO) = X                                                       SWAP      54
      INTO = INTO - I                                                   SWAP      55
  120 I = I + 1                                                         SWAP      56
      KKT = NKF + K                                                     SWAP      57
      NKF = NKF + N - K                                                 SWAP      58
```

```
              IMAGE = IMAGE - K                                                       SWAP      59
              INTO = IMAGE                                                            SWAP      60
          130 I = K                                                                   SWAP      61
          140 IF (KEY) 150,190,150                                                    SWAP      62
          150 KEY = 0                                                                 SWAP      63
          160 LOV2 = L / 2                                                            SWAP      64
              K = L - 2                                                               SWAP      65
              DO 170  I = 3,LOV2                                                      SWAP      66
              X = A(I)                                                                SWAP      67
              A(I) = A(K)                                                             SWAP      68
              A(K) = X                                                                SWAP      69
          170 K = K - 1                                                               SWAP      70
              IF (KEY) 180,190,180                                                    SWAP      71
          180 KEY = 0                                                                 SWAP      72
              GO TO 100                                                               SWAP      73
        C                                                                             SWAP      74
          190 RETURN                                                                  SWAP      75
              END                                                                     SWAP      76
```

```
    SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS      DEF LINE      REFERENCES
    3  SWAP           29           74

VARIABLES      SN  TYPE            RELOCATION
    0  A           REAL          ARRAY     F.P.        REFS         31          51          52          66          67
                                                    DEFINED         29          52          53          67          68
  103  I           INTEGER                             REFS         54          55          66          67     DEFINED          48          55
                                                         60         65
  105  IK          INTEGER                             REFS         51          52     DEFINED          50
  101  IMAGE       INTEGER                             REFS         58          59     DEFINED          46          58
  102  INTO        INTEGER                             REFS         52          53          54     DEFINED          47          54          59
  104  K           INTEGER                             REFS         56          57          58          60          67          68          69
                                                    DEFINED         49          64          69
   75  KEY         INTEGER                             REFS         61          70     DEFINED          40          62          71
   77  KKT         INTEGER                             REFS         50     DEFINED          44          56
   74  L           INTEGER                             REFS         46          47          63          64     DEFINED          39
   76  LOCK        INTEGER                             REFS         49     DEFINED          41
  107  LOV2        INTEGER                             REFS         65     DEFINED          63
    0  M           INTEGER                 F.P.        REFS         37          42     DEFINED          29
   73  N           INTEGER                             REFS         38        2*39          41          43          45          57
                                                    DEFINED         37
  100  NKF         INTEGER                             REFS         50          56          57     DEFINED          45          57
  106  X           REAL                                REFS         53          68     DEFINED          51          66

INLINE FUNCTIONS    TYPE    ARGS         DEF LINE   REFERENCES
       IABS         INTEGER    1   INTRIN                 37
       IABSF        INTEGER    1     SF         35        37

STATEMENT LABELS               DEF LINE    REFERENCES
    0  90           INACTIVE       39          38
   17  100                         43          42          72
    0  110          INACTIVE       44        2*43
```

```
STATEMENT LABELS                   DEF LINE   REFERENCES
    0  120                            55         50
    0  130                            60         49
   51  140                            61         43
    0  150          INACTIVE          62         2*61
   53  160                            63         42
    0  170                            69         65
    0  180          INACTIVE          71         2*70
   72  190                            74         2*38      42        61        70

LOOPS  LABEL      INDEX      FROM-TO     LENGTH     PROPERTIES
   27  130        K            49 60       22B                NOT INNER
   33  120        IK           50 55        5B        INSTACK
   63  170        I            65 69        3B        INSTACK

STATISTICS
  PROGRAM LENGTH                 112B      74
          52000B CM USED
```

```
C45700, FUN. DOTPRO                                                      DO1PRO    2
C                                                                        DOTPRO    3
C*********************************************************************** DOTPRO    4
C                                                                      * DOTPRO    5
C***  SUBROUTINE        ************************************************ DOTPRO    6
C                                                                      * DOTPRO    7
C***  COMPUTER VERSION  ************************************************ DOTPRO    8
C     ----------------                                                 * DOTPRO    9
C     IBM .... INCLUDES DOUBLE PRECISION TYPE STATEMENTS.  COLUMN ONE  * DOTPRO   10
C              SHOULD BE BLANK.                                        * DOTPRO   11
C                                                                      * DOTPRO   12
C     CDC .... DOES NOT INCLUDE DOUBLE PRECISION TYPE STATEMENTS.      * DOTPRO   13
C              THESE STATEMENTS ARE CONVERTED INTO COMMENTS BY         * DOTPRO   14
C              INSERTING THE LETTER C IN COLUMN ONE.                   * DOTPRO   15
C                                                                      * DOTPRO   16
C***  OBJECTIVE  ******************************************************* DOTPRO   17
C     ---------                                                        * DOTPRO   18
C     CALCULATE THE DOT PRODUCT OF TWO VECTORS                         * DOTPRO   19
C                                                                      * DOTPRO   20
C***  INPUT/OUTPUT  **************************************************** DOTPRO   21
C     ------------                                                     * DOTPRO   22
C                                                                      * DOTPRO   23
C***  SUMMARY OF SYMBOLS  ********************************************** DOTPRO   24
C     ------------------                                               * DOTPRO   25
C                                                                      * DOTPRO   26
C***  ERROR MESSAGES  ************************************************** DOTPRO   27
C     --------------                                                   * DOTPRO   28
C     NONE.                                                            * DOTPRO   29
C                                                                      * DOTPRO   30
C*********************************************************************** DOTPRO   31
      FUNCTION DOTPRO(X,Y)                                               DOTPRO   32
C                                                                        DOTPRO   33
CIBM  BEGINNING OF TYPE STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS DOTPRO   34
C     DOUBLE PRECISION S,DOTPRO                                          DOTPRO   35
CIBM  ENDING OF TYPE STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS    DOTPRO   36
C                                                                        DOTPRO   37
      DIMENSION X(1),Y(1)                                                DOTPRO   38
C                                                                        DOTPRO   39
      COMMON /INFO/ S,N,IX,IY                                            DOTPRO   40
C                                                                        DOTPRO   41
      IF (N) 120,120,100                                                 DOTPRO   42
  100 JX = 1                                                             DOTPRO   43
      JY = 1                                                             DOTPRO   44
      DO 110  J = 1,N                                                    DOTPRO   45
      S = S + X(JX)*Y(JY)                                                DOTPRO   46
      JX = JX + IX                                                       DOTPRO   47
  110 JY = JY + IY                                                       DOTPRO   48
  120 DOTPRO = S                                                         DOTPRO   49
C                                                                        DOTPRO   50
      RETURN                                                             DOTPRO   51
      END                                                                DOTPRO   52
```

```
      SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS     DEF LINE     REFERENCES
    4  DOTPRO        31          50

VARIABLES      SN  TYPE           RELOCATION
   30  DOTPRO       REAL                         DEFINED       48
    2  IX           INTEGER             INFO       REFS        39        46
    3  IY           INTEGER             INFO       REFS        39        47
   33  J          * INTEGER                      DEFINED       44
   31  JX           INTEGER                        REFS        45        46    DEFINED        42        46
   32  JY           INTEGER                        REFS        45        47    DEFINED        43        47
    1  N            INTEGER             INFO       REFS        39        41         44
    0  S            REAL                INFO       REFS        39        45         48   DEFINED        45
    0  X            REAL        ARRAY    F.P.      REFS        37        45    DEFINED        31
    0  Y            REAL        ARRAY    F.P.      REFS        37        45    DEFINED        31

STATEMENT LABELS               DEF LINE   REFERENCES
    0  100          INACTIVE      42          41
    0  110                        47          44
   26  120                        48         2*41

LOOPS  LABEL     INDEX      FROM-TO     LENGTH    PROPERTIES
   20  110       J           44 47          4B     INSTACK

COMMON BLOCKS    LENGTH     MEMBERS - BIAS NAME(LENGTH)
       INFO          4                 0 S       (1)              1 N       (1)                2 IX      (1)
                                       3 IY      (1)

STATISTICS
  PROGRAM LENGTH                   36B       30
  CM LABELED COMMON LENGTH          4B        4
        52000B CM USED
```

```
      C54700, FUN  ANDOR                                                      ANDOR     2
      C                                                                       ANDOR     3
      C********************************************************************** ANDOR     4
      C                                                                     * ANDOR     5
      C***  SUBROUTINE         ********************************************** ANDOR     6
      C                                                                     * ANDOR     7
      C***  COMPUTER VERSION   ********************************************** ANDOR     8
      C     ----------------                                                * ANDOR     9
      C     IBM .... AS IS.                                                 * ANDOR    10
      C                                                                     * ANDOR    11
      C     CDC .... AS IS.                                                 * ANDOR    12
      C                                                                     * ANDOR    13
      C***  OBJECTIVE  ************************************************** ANDOR    14
      C     ---------                                                       * ANDOR    15
      C                                                                     * ANDOR    16
      C***  INPUT/OUTPUT  *********************************************** ANDOR    17
      C     ------------                                                    * ANDOR    18
      C                                                                     * ANDOR    19
      C***  SUMMARY OF SYMBOLS  ***************************************** ANDOR    20
      C     ------------------                                              * ANDOR    21
      C                                                                     * ANDOR    22
      C***  ERROR MESSAGES  ********************************************* ANDOR    23
      C     --------------                                                  * ANDOR    24
      C     NONE.                                                           * ANDOR    25
      C                                                                     * ANDOR    26
      C***. ***************************************************************** ANDOR    27
            FUNCTION ANDOR(X,Y,IFLAG)                                         ANDOR    28
      C                                                                       ANDOR    29
            LOGICAL UND,JA,NEIN                                               ANDOR    30
      C                                                                       ANDOR    31
            EQUIVALENCE (UND,E),(JA,SI),(NEIN,RNO)                            ANDOR    32
      C                                                                       ANDOR    33
          1 SI=X                                                              ANDOR    34
            RNO = Y                                                           ANDOR    35
            UND=JA.AND.NEIN                                                   ANDOR    36
            IF(IFLAG.EQ.1)UND=JA.OR.NEIN                                      ANDOR    37
            ANDOR = E                                                         ANDOR    38
      C                                                                       ANDOR    39
            RETURN                                                            ANDOR    40
            END                                                               ANDOR    41
```

SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS	DEF LINE	REFERENCES
4 ANDOR	27	39

VARIABLES	SN	TYPE	RELOCATION					
17	ANDOR	REAL		DEFINED	37			
20	E	REAL		REFS	31	37		
0	IFLAG	INTEGER	F.P.	REFS	36	DEFINED	27	
21	JA	LOGICAL		REFS	29	31	35	36
22	NEIN	LOGICAL		REFS	29	31	35	36
23	RNO	REAL		REFS	31	DEFINED	34	

```
VARIABLES      SN  TYPE           RELOCATION
   21  SI          REAL                               REFS      31    DEFINED      33
   20  UND         LOGICAL                            REFS      29       31    DEFINED      35      36
    0  X           REAL                   F.P.        REFS      33    DEFINED      27
    0  Y           REAL                   F.P.        REFS      34    DEFINED      27

STATEMENT LABELS            DEF LINE   REFERENCES
    0  1            INACTIVE      33

EQUIV CLASSES    LENGTH     MEMBERS - BIAS NAME(LENGTH)
       UND           1                0 E      (1)
       JA            1                0 SI     (1)
       NEIN          1                0 RNO    (1)

STATISTICS
  PROGRAM LENGTH                     23B      19
          52000B CM USED
```

```
C45700. SUB  TRIEQ                                                      TRIEQ       2
C                                                                       TRIEQ       3
C*********************************************************************** TRIEQ       4
C                                                                     * TRIEQ       5
C***  SUBROUTINE          ******************************************** TRIEQ       6
C                                                                     * TRIEQ       7
C***  COMPUTER VERSION  ********************************************** TRIEQ       8
C     ----------------                                                * TRIEQ       9
C     IBM . .. INCLUDES DOUBLE PRECISION TYPE STATEMENTS.  COLUMN ONE * TRIEQ      10
C              SHOULD BE BLANK.                                       * TRIEQ      11
C                                                                     * TRIEQ      12
C     CDC .... DOES NOT INCLUDE DOUBLE PRECISION TYPE STATEMENTS.     * TRIEQ      13
C              THESE STATEMENTS ARE CONVERTED INTO COMMENTS BY        * TRIEQ      14
C              INSERTING THE LETTER C IN COLUMN ONE.                  * TRIEQ      15
C                                                                     * TRIEQ      16
C***  OBJECTIVE  ***************************************************** TRIEQ      17
C     ---------                                                       * TRIEQ      18
C     CALCULATE THE EIGENVECTORS IN THE PHYSICAL COORDINATE SYSTEM    * TRIEQ      19
C     USING THE TRANSPOSE OF THE CHOLESKY DECOMPOSITION MATRIX        * TRIEQ      20
C     AND THE EIGENVECTORS IN THE TRANSFORMED COORDINATE SYSTEM.      * TRIEQ      21
C                                                                     * TRIEQ      22
C***  INPUT/OUTPUT  ************************************************** TRIEQ      23
C     ------------                                                    * TRIEQ      24
C                                                                     * TRIEQ      25
C***  SUMMARY OF SYMBOLS  ******************************************** TRIEQ      26
C     ------------------                                              * TRIEQ      27
C                                                                     * TRIEQ      28
C***  ERROR MESSAGES  ************************************************ TRIEQ      29
C     --------------                                                  * TRIEQ      30
C     NONE.                                                           * TRIEQ      31
C                                                                     * TRIEQ      32
C*********************************************************************** TRIEQ      33
      SUBROUTINE TRIEQ (A,Y,M,L,INDIC8)                                 TRIEQ      34
C                                                                       TRIEQ      35
CIBM  BEGINNING OF TYPE STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS TRIEQ      36
C     DOUBLE PRECISION SUM                                              TRIEQ      37
CIBM  ENDING OF TYPE STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS   TRIEQ      38
C                                                                       TRIEQ      39
C                                                                       TRIEQ      40
      DIMENSION A(1),Y(1)                                               TRIEQ      41
C                                                                       TRIEQ      42
C                                                                       TRIEQ      43
      EQUIVALENCE (SUN,SUM)                                             TRIEQ      44
C                                                                       TRIEQ      45
      L1 = L                                                            TRIEQ      46
      LM1 = L1-1                                                        TRIEQ      47
      MM1 = M-1                                                         TRIEQ      48
      IF (INDIC8) 130,100,100                                           TRIEQ      49
  100 Y(L1) = Y(L1)/A(L1)                                               TRIEQ      50
      IF (MM1) 105,125,105                                              TRIEQ      51
  105 I1 = L1                                                           TRIEQ      52
      DO 120 I=L1,MM1                                                   TRIEQ      53
      I1 = I1+I                                                         TRIEQ      54
      SUM = -Y(I+1)                                                     TRIEQ      55
      IJ = I1                                                           TRIEQ      56
      DO 110 J=L1,I                                                     TRIEQ      57
      SUM = SUM+A(IJ)*Y(J)                                              TRIEQ      58
```

```
            WRITE(ITAPEW,9004)                                                  VIBRAP     287
            KOUNT=KOUNT+4                                                       VIBRAP     288
         25 CONTINUE                                                            VIBRAP     289
            WRITE(ITAPEW,9006) NUM,(XPRIM(J,NUM),J=1,3),DOF(NUM)                VIBRAP     290
            KOUNT=KOUNT+1                                                       VIBRAP     291
         20 CONTINUE                                                            VIBRAP     292
      C                                                                         VIBRAP     293
      C     READ THE REFERENCE BEAM & THE RATIO OF MAXIMUM DISPLACEMENT         VIBRAP     294
      C     TO THE REFERENCE BEAM LENGTH                                        VIBRAP     295
            READ(ITAPER,9007) BMREF,RATIO                                       VIBRAP     296
      C                                                                         VIBRAP     297
      C                                                                         VIBRAP     298
      C                                                                         VIBRAP     299
      C                                                                         VIBRAP     300
      C     READ BEAM NAME, NUMBER OF PTS ON BEAM, AND BEAM POINT NUMBERS       VIBRAP     301
      C                                                                         VIBRAP     302
            READ(ITAPER,9003) NBEAMS                                            VIBRAP     303
            KOUNT=LINES                                                         VIBRAP     304
      C                                                                         VIBRAP     305
            DO 30 I=1,NBEAMS                                                    VIBRAP     306
            READ(ITAPER,9008) WORD1,WORD2,NPTBM                                 VIBRAP     307
            READ(ITAPER,9003) (JPTS(K),K=1,NPTBM)                               VIBRAP     308
            CALL TITLES(2)                                                      VIBRAP     309
            IF(KOUNT.GT.KOUNTH) GO TO 29                                        VIBRAP     310
            WRITE(ITAPEW,9009)                                                  VIBRAP     311
            KOUNT=KOUNT+5                                                       VIBRAP     312
         29 CONTINUE                                                            VIBRAP     313
            WRITE(ITAPEW,9010) I,WORD1,WORD2,(JPTS(K),K=1,NPTBM)                VIBRAP     314
            KOUNT=KOUNT+1                                                       VIBRAP     315
      C     WRITE THE INPUT DATA ON MTAP3 FOR USE LATER ON IN THE PROGRAM       VIBRAP     316
            WRITE (MTAP3)  WORD1, WORD2, NPTBM                                  VIBRAP     317
            WRITE (MTAP3)  (JPTS(K),K=1,NPTBM)                                  VIBRAP     318
            IF (WORD1.EQ.BMREF(1).AND.WORD2.EQ.BMREF(2)) GO TO 17               VIBRAP     319
            GO TO 30                                                            VIBRAP     320
      C     COMPUTE THE REFERENCE BEAM LENGTH TO RESCALE MODAL DISPLACEMENTS    VIBRAP     321
         17 NENDP1  =  JPTS(1)                                                  VIBRAP     322
            NENDP2  =  JPTS(NPTBM)                                              VIBRAP     323
            XDIST  =  XPRIM(1,NENDP1)  -  XPRIM(1,NENDP2)                       VIBRAP     324
            YDIST  =  XPRIM(2,NENDP1)  -  XPRIM(2,NENDP2)                       VIBRAP     325
            ZDIST  =  XPRIM(3,NENDP1)  -  XPRIM(3,NENDP2)                       VIBRAP     326
            BEAML2 =  XDIST**2  +  YDIST**2 + ZDIST**2                          VIBRAP     327
            BEAML  =  SQRT(BEAML2)                                              VIBRAP     328
            DSPMX1  =  RATIO *  BEAML                                           VIBRAP     329
         30 CONTINUE                                                            VIBRAP     330
      C                                                                         VIBRAP     331
      C                                                                         VIBRAP     332
      C                                                                         VIBRAP     333
      C                                                                         VIBRAP     334
      C                                                                         VIBRAP     335
      C                                                                         VIBRAP     336
            IUCOM=IUPHTF                                                        VIBRAP     337
            IFCOM=IFPHTF                                                        VIBRAP     338
            IF(KFREE.EQ.2) IUCOM=IUPATF                                         VIBRAP     339
            IF(KFREE.EQ.2) IFCOM=IFPATF                                         VIBRAP     340
      C                                                                         VIBRAP     341
            CALL GEDLAB(8HVIBRAPO1,IUCOM,NAME,IFCOM,NMODES,NCOL)                VIBRAP     342
      C                                                                         VIBRAP     343
```

```
C     FORM ELEMENTS OF A MATRIX - USED TO DEFINE FIRST ROTATION          VIBRAP    230
C                                                                        VIBRAP    231
C                                                                        VIBRAP    232
      A(1,1)  = 1.                                                       VIBRAP    233
      A(2,2)  = COS(THET1R)                                              VIBRAP    234
      A(2,3)  = SIN(THET1R)                                              VIBRAP    235
      A(3,2)  = -SIN(THET1R)                                             VIBRAP    236
      A(3,3)  =  COS(THET1R)                                             VIBRAP    237
C                                                                        VIBRAP    238
C     FORM ELEMENTS OF B MATRIX - USED TO DEFINE SECOND ROTATION         VIBRAP    239
      B(1,1) = COS(THET2R)                                               VIBRAP    240
      B(1,3) =-SIN(THET2R)                                               VIBRAP    241
      B(2,2) = 1.                                                        VIBRAP    242
      B(3,1) = SIN(THET2R)                                               VIBRAP    243
      B(3,3) = COS(THET2R)                                               VIBRAP    244
C                                                                        VIBRAP    245
C     FORM ELEMENTS OF C MATRIX - USED TO DEFINE THIRD ROTATION          VIBRAP    246
      C(1,1) = COS(THET3R)                                               VIBRAP    247
      C(1,2) = SIN(THET3R)                                               VIBRAP    248
      C(2,1) =-SIN(THET3R)                                               VIBRAP    249
      C(2,2) = COS(THET3R)                                               VIBRAP    250
      C(3,3) = 1.                                                        VIBRAP    251
C                                                                        VIBRAP    252
C     POSTMULTIPLY C MATRIX BY B                                         VIBRAP    253
      CALL MMULT (C,B,XXX,3,3,3,3,3,3)                                   VIBRAP    254
C                                                                        VIBRAP    255
C     POSTMULTIPLY  CB  BY A                                             VIBRAP    256
      CALL MMULT (XXX,A,PI,3,3,3,3,3,3)                                  VIBRAP    257
C                                                                        VIBRAP    258
C     TRANSPOSE PI MATRIX                                                VIBRAP    259
C                                                                        VIBRAP    260
      DO 10 I=1,3                                                        VIBRAP    261
      DO 10 J=1,3                                                        VIBRAP    262
   10 PITR(I,J) = PI(J,I)                                                VIBRAP    263
C                                                                        VIBRAP    264
C     PREMULTIPLY PI TRANSPOSE BY RORMV TO GET PROJECTING MATRIX INTO    VIBRAP    265
C     Y-Z PLANE.                                                         VIBRAP    266
      CALL  MMULT (RORMV,PITR,PROD,2,3,3,2,3,2)                          VIBRAP    267
C                                                                        VIBRAP    268
C     PROD IS MATRIX USED TO TRANSFORM TO VIEWING PLANE (Y-Z)            VIBRAP    269
C     WRITE (ITAPEW,500)  ((PROD(I,J),J=1,3),I=1,2)                      VIBRAP    270
C 500 FORMAT (3E15.6)                                                    VIBRAP    271
C                                                                        VIBRAP    272
C                                                                        VIBRAP    273
C                                                                        VIBRAP    274
      READ(ITAPER,9003) NC                                               VIBRAP    275
C     NC IS THE NUMBER OF CARDS ON WHICH COORDINATES ARE ENTERED         VIBRAP    276
C                                                                        VIBRAP    277
      CALL PLB(1,3,ITAPEW)                                               VIBRAP    278
      KOUNT=KOUNT+3                                                      VIBRAP    279
      WRITE(ITAPEW,9004)                                                 VIBRAP    280
      KOUNT=KOUNT+4                                                      VIBRAP    281
C                                                                        VIBRAP    282
      DO 20 I=1,NC                                                       VIBRAP    283
      READ(ITAPER,9005) NUM,(XPRIM(J,NUM),J=1,3),DOF(NUM)                VIBRAP    284
      CALL TITLES(2)                                                     VIBRAP    285
```

```
            MAX1    =  800                                                VIBRAP    173
            MAX2    =  457                                                VIBRAP    174
            MAX3    =  20                                                 VIBRAP    175
            CALL DVALUE (A     ,ZER?,I33)                                 VIBRAP    176
            CALL DVALUE (B     ,ZERO,I33)                                 VIBRAP    177
            CALL DVALUE (C     ,ZERO,I33)                                 VIBRAP    178
            CALL DVALUE (PI    ,ZERO,I33)                                 VIBRAP    179
            CALL DVALUE (PITR  ,ZERO,I33)                                 VIBRAP    180
            CALL DVALUE (XXX   ,ZERO,I33)                                 VIBRAP    181
            CALL DVALUE (PROD  ,ZERO,I23)                                 VIBRAP    182
            CALL DVALUE (RORMV ,ZERO,I23)                                 VIBRAP    183
            CALL DVALUE (SCRTCH,ZERO,3)                                   VIBRAP    184
            CALL DVALUE (SCRT2 ,ZERO,2)                                   VIBRAP    185
            CALL DVALUE (XPRIM ,ZERO,3*MAX1)                              VIBRAP    186
            CALL DVALUE (WKAREA,ZERO,3*MAX3)                              VIBRAP    187
            CALL DVALUE (COORD ,ZERO,3*MAX2)                              VIBRAP    188
            CALL DVALUE (DISPPT,ZERO,3*MAX3)                              VIBRAP    189
            CALL DVALUE (DISP  ,ZERO,MAX1)                                VIBRAP    190
            CALL DVALUE (DOF   ,ZERO,MAX1)                                VIBRAP    191
            CALL DVALUE (U     ,ZERO,MAX2)                                VIBRAP    192
            CALL DVALUE (V     ,ZERO,MAX2)                                VIBRAP    193
      C                                                                   VIBRAP    194
      C     DEFINE ELEMENTS REQUIRED TO TRANSFORM TO Y-Z PLANE            VIBRAP    195
            RORMV(1,2) =-1.                                               VIBRAP    196
            RORMV(2,3) = 1.                                               VIBRAP    197
      C                                                                   VIBRAP    198
      C                                                                   VIBRAP    199
      C                                                                   VIBRAP    200
      C                                                                   VIBRAP    201
      C     THE VIEW THAT THIS PROGRAM WILL PRINT ON THE CALCOMP PLOTTER  VIBRAP    202
      C     IS SPECIFIED BY 3 ANGLES OF ROTATION, THET1D, THET2D,         VIBRAP    203
      C     AND THET3D. IMAGINE A LEFT HAND COORDINATE SYSTEM ATTACHED TO VIBRAP    204
      C     THE SURFACE TO BE DRAWN WITH THE ORIGIN AT THE FORWARD MOST   VIBRAP    205
      C     POINT OF THE SURFACE. THE                                     VIBRAP    206
      C          POSITIVE X  AXIS IS AFT                                  VIBRAP    207
      C          POSITIVE Y  AXIS IS OUTBOARD ON THE LEFT WING            VIBRAP    208
      C          POSITIVE Z  AXIS IS UP                                   VIBRAP    209
      C     THE SURFACE TO BE DRAWN IS FIRST ROTATED ALONG THE X -AXIS    VIBRAP    210
      C     THROUGH AN ANGLE, THET1D (DEGREES). NEXT, FOLLOWS A ROTATION  VIBRAP    211
      C     ABOUT THE CARRIED Y -AXIS OF THET2D (DEGREES) AND FINALLY     VIBRAP    212
      C     A ROTATION OF THET3D (DEGREES)  ABOUT THE CARRIED Z -AXIS. NOTE VIBRAP  213
      C     THAT ALL ROTATIONS ARE POSITIVE ACCORDING TO THE LEFT HAND RULE. VIBRAP 214
      C     THE VIEW ON THE CALCOMP WILL BE ALONG THE ORIGINAL (I.E. UNROTATED VIBRAP 215
      C     X AXIS FROM AFT TO FORE (I.E. ALONG VECTOR ALONG NEGATIVE X AXIS) VIBRAP 216
      C                                                                   VIBRAP    217
      C                                                                   VIBRAP    218
      C                                                                   VIBRAP    219
      C                                                                   VIBRAP    220
      C     READ THE ANGLES ASSOCIATED WITH THE PERSPECTIVE VIEWING       VIBRAP    221
      C                                                                   VIBRAP    222
            READ(ITAPER,9002) THET1D,THET2D,THET3D                        VIBRAP    223
      C                                                                   VIBRAP    224
         23 DEGTOR  = 3.14159/180.                                        VIBRAP    225
            THET1R  =  THET1D * DEGTOR                                    VIBRAP    226
            THET2R  = THET2D  * DEGTOR                                    VIBRAP    227
            THET3R  = THET3D  * DEGTOR                                    VIBRAP    228
      C                                                                   VIBRAP    229
```

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      DASH  =  0.14                                                     VIBRAP    116
      BLANK  =   .07                                                    VIBRAP    117
C                                                                       VIBRAP    118
C     LENGTH OF HORIZONTAL SCALE FOR CALCOMP, HSCALE                    VIBRAP    119
C                                                                       VIBRAP    120
C     LENGTH OF VERTICAL SCALE FOR CALCOMP, VSCALE                      VIBRAP    121
C                                                                       VIBRAP    122
      HSC(ALE=15.                                                       VIBRAP    123
      VSCALE=10.                                                        VIBRAP    124
      HSCLP4  =  HSCALE  +  4.                                          VIBRAP    125
      REWIND MTAP1                                                      VIBRAP    126
      REWIND MTAP2                                                      VIBRAP    127
      REWIND MTAP3                                                      VIBRAP    128
      REWIND MTAP4                                                      VIBRAP    129
C                                                                       VIBRAP    130
CIBM  BEGINNING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS     VIBRAP    131
C     REWIND MTAP8                                                      VIBRAP    132
C     REWIND MTAP9                                                      VIBRAP    133
CIBM  ENDING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS        VIBRAP    134
C                                                                       VIBRAP    135
C                                                                       VIBRAP    136
      CALL PROGNA (4H(VIB, 4HRAP))                                      VIBRAP    137
C                                                                       VIBRAP    138
      KOUNT  =  LINES                                                   VIBRAP    139
      CALL TITLES (2)                                                   VIBRAP    140
      KOUNT  =  KOUNT + 3                                               VIBRAP    141
      DO 1  I=1,3                                                       VIBRAP    142
      READ (ITAPER,9000)  TITLE                                         VIBRAP    143
      WRITE(ITAPEW,9001) TITLE                                          VIBRAP    144
    1 CONTINUE                                                          VIBRAP    145
C                                                                       VIBRAP    146
      IF(KPLOTS.EQ.NO) GO TO 77                                         VIBRAP    147
      KPLOTS =  NO                                                      VIBRAP    148
      KOUNT  =  KOUNT + 2                                               VIBRAP    149
      CALL PLB (1,1,ITAPEW)                                             VIBRAP    150
      WRITE(ITAPEW,9016)                                                VIBRAP    151
C                                                                       VIBRAP    152
CIBM                                                                    VIBRAP    153
C     IBUFD  =  1512                                                    VIBRAP    154
C     CALL PLOTS (BUFFER,IBUFD)                                         VIBRAP    155
CIBM                                                                    VIBRAP    156
C                                                                       VIBRAP    157
CCDC                                                                    VIBRAP    158
      IBUFD = 512                                                       VIBRAP    159
      ITAP60 = 60                                                       VIBRAP    160
      REWIND ITAP60                                                     VIBRAP    161
      CALL PLOTS (BUFFER,IBUFD,ITAP60)                                  VIBRAP    162
CCDC                                                                    VIBRAP    163
C                                                                       VIBRAP    164
   77 CONTINUE                                                          VIBRAP    165
C                                                                       VIBRAP    166
C                                                                       VIBRAP    167
C     INITIALIZE MATRICES                                               VIBRAP    168
C                                                                       VIBRAP    169
      I33    =  3*3                                                     VIBRAP    170
      ZERO   =  0.0                                                     VIBRAP    171
      I23    =  2*3                                                     VIBRAP    172
```

```
          1                ,KBPAGE,LINESG,KOUNTH,KOUNTI                         VIBRAP      59
           COMMON /CTABLE/ KTABLE,NPASS ,NROWS ,NCOLS ,NCOLST,KTABLO,NPAGEA     VIBRAP      60
          1                ,ITAPET                                              VIBRAP      61
           COMMON/PLACES/  IUIN1,IUIN2,IUOUT1,IUOUT2,IUGO1,IUGO2,IUGO3,IUGO4,   VIBRAP      62
          1                IUSCR,IFSCR,IFS1,IFS2,IFS3,IFS4,IUCD,IUPR,           VIBRAP      63
          2                IUA,IFA,IUY,IFY,IUMEMN,IFMEMN,IUSTFN,IFSTFN,         VIBRAP      64
          3                IUKS,IFKS,IUB,IFB,IUDESO,IFDESO,                     VIBRAP      65
          4                IUMDBI,IFMDBI,IUADDI,IFADDI,IUBALI,IFBALI,           VIBRAP      66
          5                IUDESI,IFDESI,IUWTI,IFWTI,                           VIBRAP      67
          6                IUMEMO,IFMEMO,IUBT,IFBT,                             VIBRAP      68
          7                IUDESN,IFDESN,IUMD,IFMD,                             VIBRAP      69
          8                IUMEMF,IFMEMF,                                       VIBRAP      70
          9                IUSTFO,IFSTFO,IUMDB,IFMDB,IUADD,IFADD,IUBAL,IFBAL,   VIBRAP      71
          A                IUDESF,IFDESF,IUWT,IFWT,                             VIBRAP      72
          B                IUDUM1,IFDUM1,IUDUM2,IFDUM2,IUDUM3,IFDUM3,           VIBRAP      73
          C                IUL,IFL,IUYT,IFYT,IUZ,IFZ,IUZR,IFZR,IULR,IFLR,       VIBRAP      74
          D                IUBR,IFBR,                                           VIBRAP      75
          E                IUPHTF,IFPHTF,IUMODM,IFMODM,                         VIBRAP      76
          F                IUMODK,IFMODK,IUPHT,IFPHT,IUQT,IFQT,IUQ,IFQ,         VIBRAP      77
          G                IUPH,IFPH,IUINCM,IFINCM,IUINCK,IFINCK                VIBRAP      78
           COMMON /PLAYFF/ IUMDFF,IFMDFF,IUDLTI,IFDLTI,IUSLTI,IFSLTI            VIBRAP      79
          1                ,IUMPLI,IFMPLI,IUTPGT,IFTPGT,IUPATF,IFPATF           VIBRAP      80
          2                ,IUMPL,IFMPL,IUSLT,IFSLT,IUDLT,IFDLT                 VIBRAP      81
          3                ,IUQA,IFQA,IUQAT,IFQAT,IUPHA,IFPHA,IUPHAT,IFPHAT     VIBRAP      82
           COMMON /KLUFF/ KFREE                                                 VIBRAP      83
      C                                                                         VIBRAP      84
           EQUIVALENCE     (U(1),COORD(1,1)) , (V(1),COORD(2,153))              VIBRAP      85
           EQUIVALENCE     (UU(1),XX(1)) ,  (VV(1),XX(458))                     VIBRAP      86
           EQUIVALENCE     (MPLOT(1),A(1,1)),  (MPLOT(10),B(1,1))               VIBRAP      87
           EQUIVALENCE     (MPLOT(19),C(1,1))                                   VIBRAP      88
           EQUIVALENCE     (TITLE(1),MPLOT(1))                                  VIBRAP      89
      C                                                                         VIBRAP      90
           DATA   XSYM/4H   X/,  YSYM/4H   Y/,  ZSYM/4H   Z/                    VIBRAP      91
           DATA   VAPL/4HVAPL/                                                  VIBRAP      92
      C                                                                         VIBRAP      93
      C                                                                         VIBRAP      94
           REWIND ITAPER                                                        VIBRAP      95
       100 READ (ITAPER,9000) VPVAR                                             VIBRAP      96
           IF (VPVAR.NE.VAPL)   GOTO 100                                        VIBRAP      97
      C                                                                         VIBRAP      98
      C                                                                         VIBRAP      99
      C                                                                         VIBRAP     100
      C    INITIALIZATION OF I/O UNITS                                          VIBRAP     101
      C                                                                         VIBRAP     102
           MTAP1  =  ITAPES(21)                                                 VIBRAP     103
           MTAP2  =  ITAPES(22)                                                 VIBRAP     104
           MTAP3  =  ITAPES(23)                                                 VIBRAP     105
           MTAP4  =  ITAPES(24)                                                 VIBRAP     106
      C                                                                         VIBRAP     107
      CIBM BEGINNING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS        VIBRAP     108
      C    MTAP8  =  ITAPES(28)                                                 VIBRAP     109
      C    MTAP9  =  ITAPES(29)                                                 VIBRAP     110
      CIBM ENDING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS           VIBRAP     111
      C                                                                         VIBRAP     112
      C                                                                         VIBRAP     113
      C    DATA FOR DASHED LINE THROUGH DISPLACEMENT                            VIBRAP     114
      C                                                                         VIBRAP     115
```

```
      SUBROUTINE VIBRAP (KPLOTV,KPLOTF,NPLOTV)                          VIBRAP     2
C                                                                       VIBRAP     3
      INTEGER YES                                                       VIBRAP     4
C                                                                       VIBRAP     5
C     THIS PROGRAM WILL DRAW A GRID AND MODE SHAPE IN PROJECTION ON THE VIBRAP     6
C     CALCOMP PLOTTER                                                   VIBRAP     7
C                                                                       VIBRAP     8
C                                                                       VIBRAP     9
C                                                                       VIBRAP    10
C     MAXIMUM NUMBER OF BEAMS IN GRID  =  40                            VIBRAP    11
C                                                                       VIBRAP    12
C                                                                       VIBRAP    13
C     MAXIMUM NUMBER OF POINTS ON A BEAM  =  20                         VIBRAP    14
C                                                                       VIBRAP    15
C     LARGEST VALUE OF GRID PT. NUMBER  =  800                          VIBRAP    16
C                                                                       VIBRAP    17
C     MAXIMUM NUMBER OF MODES TO BE PLOTTED  =  20                      VIBRAP    18
C                                                                       VIBRAP    19
C                                                                       VIBRAP    20
CIBM                                                                    VIBRAP    21
C     DIMENSION BUFFER(1512)                                            VIBRAP    22
CIBM                                                                    VIBRAP    23
C                                                                       VIBRAP    24
CCDC                                                                    VIBRAP    25
      DIMENSION BUFFER(512)                                             VIBRAP    26
CCDC                                                                    VIBRAP    27
C                                                                       VIBRAP    28
      DIMENSION        A(3,3) ,       B(3,3) ,       C(3,3)             VIBRAP    29
      DIMENSION     BMREF(2)                                            VIBRAP    30
      DIMENSION     DISP(800) ,     DOF(800)                            VIBRAP    31
      DIMENSION   DISPPT(3,20)                                          VIBRAP    32
      DIMENSION     IDISP(800)                                          VIBRAP    33
      DIMENSION ITAPES(50)                                              VIBRAP    34
      DIMENSION      JPTS(20)                                           VIBRAP    35
      DIMENSION MPLOT(40)                                               VIBRAP    36
      DIMENSION    NCOORD(457) ,  NCDEF(457) ,   NPTSBM(40)             VIBRAP    37
      DIMENSION     RORMV(2,3) ,  PROD(2,3)                             VIBRAP    38
      DIMENSION     SCRTCH(3) ,     SCRT2(2)                            VIBRAP    39
      DIMENSION     TITLE(18)                                           VIBRAP    40
      DIMENSION        U(457) ,       V(457)                            VIBRAP    41
      DIMENSION       UU(457) ,      VV(457)                            VIBRAP    42
      DIMENSION  U1(4) ,  V1(4)                                         VIBRAP    43
      DIMENSION   WKAREA(3,20) , COORD(3,457)                           VIBRAP    44
      DIMENSION     WORK(200)                                           VIBRAP    45
      DIMENSION      XXX(3,3) ,      PI(3,3) ,    PITR(3,3)             VIBRAP    46
      DIMENSION   XPRIM(3,800)                                          VIBRAP    47
      DIMENSION     XX(954  )                                           VIBRAP    48
      DIMENSION      XX2(954)                                           VIBRAP    49
      DIMENSION      YMIN(40) ,     ZMIN(40)                            VIBRAP    50
      DIMENSION      YMAX(40) ,     ZMAX(40)                            VIBRAP    51
      DIMENSION NAME(2)                                                 VIBRAP    52
C                                                                       VIBRAP    53
      COMMON /COMRWP/ ITAPER,ITAPEW,ITAPEP                              VIBRAP    54
      COMMON /CTAPES/ ITAPES                                            VIBRAP    55
      COMMON /CPLOTS/ KPLOTS                                            VIBRAP    56
      COMMON /CONSTS/ NO    ,YES                                        VIBRAP    57
```

```
STATEMENT LABELS               DEF LINE   REFERENCES
   46  120                        52          46
    0  130                        54          40
    0  140                        59          56
    0  150         INACTIVE       62        2*61
    0  180                        67          65
    0  190                        69          62
  123  200                        70          61

LOOPS  LABEL     INDEX      FROM-TO     LENGTH     PROPERTIES
   14  130         I          40 54       40B                NOT INNER
   23  90          J          43 45        4B       INSTACK
   40  110         J          49 51        5B       INSTACK
   64  140         I          56 59        4B       INSTACK
   77  190         L          62 69       24B                NOT INNER
  110  180         J          65 67        4B       INSTACK

EQUIV CLASSES    LENGTH     MEMBERS - BIAS NAME(LENGTH)
       SUN          1                 0 SUM    (1)

STATISTICS
  PROGRAM LENGTH                  150B     104
          52000B CM USED
```

```
          A(LL+1) = Q(I)                                                  DAGGER      59
      140 LL = LL + 1                                                     DAGGER      60
          A(LL) = SUN                                                     DAGGER      61
          IF (M - K)  150, 200, 150                                       DAGGER      62
      150 DO 190  L = K1,M                                                DAGGER      63
          JL = LL+L-K                                                     DAGGER      64
          SUM = O.                                                        DAGGER      65
          DO 180  J = 1,K                                                 DAGGER      66
          SUM = SUM + P(J)*A(JL)                                          DAGGER      67
      180 JL = JL + 1                                                     DAGGER      68
          LL = LL + L - 1                                                 DAGGER      69
      190 A(LL) = SUM                                                     DAGGER      70
      200 CONTINUE                                                        DAGGER      71
C                                                                         DAGGER      72
          RETURN                                                          DAGGER      73
          END                                                             DAGGER      74
```

```
     SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS       DEF LINE      REFERENCES
   3  DAGGER          29            72

VARIABLES      SN  TYPE            RELOCATION
   O  A            REAL       ARRAY      F.P.      REFS       31        44        50        66   DEFINED        29        58
                                                     60       69
 131  I            INTEGER                         REFS       49        52        54      2*57        58
                                                DEFINED       40        56
 130  INDEX        INTEGER                         REFS       41        53   DEFINED        39        53
 133  J            INTEGER                         REFS       44        50        51        66   DEFINED        43        49
                                                     65
 134  JL           INTEGER                         REFS       66        67   DEFINED        63        67
 124  K            INTEGER                         REFS       36        46        49        56        61        63        65
                                                DEFINED       35
   O  KO           INTEGER               F.P.      REFS       35   DEFINED        29
 125  K1           INTEGER                         REFS       40        62   DEFINED        36
 126  L            INTEGER                         REFS       43        46        47        48        53        63        68
                                                DEFINED       37        54        62
 132  LJ           INTEGER                         REFS       44        45        50        51   DEFINED        41        45
                                                     48       51
 127  LL           INTEGER                         REFS       47        48        58        59        60        63        68
                                                     69  DEFINED        38        47        59        68
   O  M            INTEGER               F.P.      REFS       61        62   DEFINED        29
   O  P            REAL       ARRAY      F.P.      REFS       31        44        50        57        66
                                                DEFINED       29
   O  Q            REAL       ARRAY      F.P.      REFS       31        57        58   DEFINED        29        52
 135  SUM          REAL                            REFS       33        44        50        57        66        69
                                                DEFINED       42        44        50        55        57        64        66
 135  SUN          REAL                            REFS       33        52        60

STATEMENT LABELS             DEF LINE    REFERENCES
   O  90                        45          43
   O  100         INACTIVE      47        2*46
   O  110                       51          49
```

```
C45700. SUB. DAGGER                                                        DAGGER   2
C                                                                          DAGGER   3
C************************************************************************ DAGGER   4
C                                                                        * DAGGER   5
C***  SUBROUTINE        ************************************************ DAGGER   6
C                                                                        * DAGGER   7
C***  COMPUTER VERSION  ************************************************ DAGGER   8
C     ----------------                                                   * DAGGER   9
C     IBM .... AS IS.                                                    * DAGGER  10
C                                                                        * DAGGER  11
C     CDC .... AS IS.                                                    * DAGGER  12
C                                                                        * DAGGER  13
C***  OBJECTIVE  ******************************************************** DAGGER  14
C     ---------                                                          * DAGGER  15
C     FORM THE EIGENVALUE COEFFICIENT MATRIX IN COLUMN SORT FOR THE      * DAGGER  16
C     STIFFNESS APPROACH.                                                * DAGGER  17
C                                                                        * DAGGER  18
C***  INPUT/OUTPUT  ***************************************************** DAGGER  19
C     ------------                                                       * DAGGER  20
C                                                                        * DAGGER  21
C***  SUMMARY OF SYMBOLS  *********************************************** DAGGER  22
C     ------------------                                                 * DAGGER  23
C                                                                        * DAGGER  24
C***  ERROR MESSAGES  *************************************************** DAGGER  25
C     --------------                                                     * DAGGER  26
C     NONE.                                                              * DAGGER  27
C                                                                        * DAGGER  28
C************************************************************************ DAGGER  29
      SUBROUTINE DAGGER(A,M,P,KO,Q)                                        DAGGER  30
C                                                                          DAGGER  31
      DIMENSION A(1),P(1),Q(1)                                             DAGGER  32
C                                                                          DAGGER  33
      EQUIVALENCE (SUN,SUM)                                                DAGGER  34
C                                                                          DAGGER  35
      K = KO                                                               DAGGER  36
      K1 = K + 1                                                           DAGGER  37
      L=1                                                                  DAGGER  38
      LL = 0                                                               DAGGER  39
      INDEX = 1                                                            DAGGER  40
      DO 130  I = 2,K1                                                     DAGGER  41
      LJ = INDEX                                                           DAGGER  42
      SUM = 0.                                                             DAGGER  43
      DO 90  J = 1,L                                                       DAGGER  44
      SUM = SUM + A(LJ)*P(J)                                               DAGGER  45
   90 LJ = LJ + 1                                                          DAGGER  46
      IF (K - L) 100,120,100                                               DAGGER  47
  100 LL = LL + L                                                          DAGGER  48
      LJ = LL + L                                                          DAGGER  49
      DO 110  J = I,K                                                      DAGGER  50
      SUM = SUM + A(LJ)*P(J)                                               DAGGER  51
  110 LJ = LJ + J                                                          DAGGER  52
  120 Q(I-1) = SUN                                                         DAGGER  53
      INDEX = INDEX + L                                                    DAGGER  54
  130 L = I                                                                DAGGER  55
      SUM = 0.                                                             DAGGER  56
      DO 140  I = 1,K                                                      DAGGER  57
      SUM = SUM + P(I)*Q(I)                                                DAGGER  58
```

```
EXTERNALS           TYPE   ARGS       REFERENCES
       SQRT       REAL       1 LIBRARY      70

INLINE FUNCTIONS    TYPE   ARGS        DEF LINE  REFERENCES
       SQRTF      REAL       1    SF        46         70

STATEMENT LABELS                DEF LINE   REFERENCES
    0  50           INACTIVE       55         54
   17  60                          57         2*54
   20  70                          58         56
   26  80                          62         57        61
    0  90                          65         63
   41  100                         66         55        61
    0  105          INACTIVE       68         67
    0  110          INACTIVE       70         69
   52  120                         73         2*67
   55  130                         74         72
    0  140                         75         59
    0  210                         77         50
   66  220                         80         83
   67  980                         82         2*69

LOOPS  LABEL     INDEX      FROM-TO     LENGTH     PROPERTIES
   11  210       K           50 77        54B                 EXT REFS    EXITS   NOT INNER
   23  140       I           59 75        36B                 EXT REFS    EXITS   NOT INNER
   34  90        KJ          63 65        4B        INSTACK

EQUIV CLASSES    LENGTH     MEMBERS - BIAS NAME(LENGTH)
       SUN          1                O SUM    (1)

STATISTICS
  PROGRAM LENGTH                   114B      76
          52000B CM USED
```

```
      70 I1 = K1                                                      FUTILE     59
         DO 140 I=K,N                                                 FUTILE     60
         SUM = -A(IK)                                                 FUTILE     61
         GO TO LEAP, (80,100)                                         FUTILE     62
      80 IJ = I1                                                      FUTILE     63
         DO 90 KJ=K1,KK1                                              FUTILE     64
         SUM = SUM+A(IJ)*A(KJ)                                        FUTILE     65
      90 IJ = IJ+1                                                    FUTILE     66
     100 I1 = I1+I                                                    FUTILE     67
         IF (I-K) 120,105,120                                         FUTILE     68
     105 DENOM = -SUM                                                 FUTILE     69
         IF (DENOM) 980,980,110                                       FUTILE     70
     110 DENOM = -SQRTF(DENOM)                                        FUTILE     71
         A(IK) = -DENOM                                               FUTILE     72
         GO TO 130                                                    FUTILE     73
     120 A(IK) = SUM/DENOM                                            FUTILE     74
     130 IK = IK+I                                                    FUTILE     75
     140 CONTINUE                                                     FUTILE     76
         K1 = K1+K                                                    FUTILE     77
     210 CONTINUE                                                     FUTILE     78
         NIX = 0                                                      FUTILE.    79
C                                                                     FUTILE     80
     220 RETURN                                                       FUTILE     81
C                                                                     FUTILE     82
     980 NIX = -K                                                     FUTILE     83
         GO TO 220                                                    FUTILE     84
C                                                                     FUTILE     85
         END                                                          FUTILE     86
```

SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS		DEF LINE	REFERENCES
3	FUTILE	34	80

VARIABLES		SN TYPE		RELOCATION								
0	A	REAL	ARRAY	F.P.	REFS	40	60	2*64	DEFINED	34	71	73
103	DENOM	REAL			REFS	69	70	71	73	DEFINED	68	70
100	I	INTEGER			REFS	66	67	74	DEFINED	59		
101	IJ	INTEGER			REFS	64	65	DEFINED	62	65		
74	IK	INTEGER			REFS	60	71	73	74	DEFINED	52	74
77	I1	INTEGER			REFS	62	66	DEFINED	58	66		
73	K	INTEGER			REFS	51	59	67	76	82		
					DEFINED	50						
102	KJ	INTEGER			REFS	64	DEFINED	63				
72	KK	INTEGER			REFS	51	52	53	DEFINED	49	51	
75	KK1	INTEGER			REFS	54	63	DEFINED	53			
71	K1	INTEGER			REFS	58	63	76	DEFINED	48	76	
76	LEAP	INTEGER			REFS	61	DEFINED	55	57			
0	N	INTEGER		F.P.	REFS	50	59	DEFINED	34			
0	NIX	INTEGER		F.P.	DEFINED	34	78	82				
104	SUM	REAL			REFS	42	64	68	73	DEFINED	60	64
104	SUN	REAL			REFS	42						

```
      C45700, SUB. FUTILE                                                   FUTILE       2
      C                                                                     FUTILE       3
      C********************************************************************** FUTILE       4
      C                                                                   * FUTILE       5
      C***   SUBROUTINE          ****************************************** FUTILE       6
      C                                                                   * FUTILE       7
      C***   COMPUTER VERSION  ******************************************** FUTILE       8
      C      ----------------                                             * FUTILE       9
      C      IBM .... INCLUDES DOUBLE PRECISION TYPE STATEMENTS.  COLUMN ONE * FUTILE      10
      C               SHOULD BE BLANK.                                    * FUTILE      11
      C                                                                   * FUTILE      12
      C      CDC .... DOES NOT INCLUDE DOUBLE PRECISION TYPE STATEMENTS.  * FUTILE      13
      C               THESE STATEMENTS ARE CONVERTED INTO COMMENTS BY     * FUTILE      14
      C               INSERTING THE LETTER C IN COLUMN ONE.               * FUTILE      15
      C                                                                   * FUTILE      16
      C***   OBJECTIVE  **************************************************** FUTILE      17
      C      ---------                                                    * FUTILE      18
      C      FORM THE CHOLESKY DECOMPOSITION OF A MATRIX.  GIVEN THE MATRIX  * FUTILE      19
      C      X, THE PROGRAM USES THE CHOLESKY DECOMPOSITION PROCEDURE TO SOLVE* FUTILE      20
      C      FOR A MATRIX WHICH IS A LOWER TRIANGULAR MATRIX AS FOLLOWS,  * FUTILE      21
      C      X =  (L) * (L TRANSPOSE).                                    * FUTILE      22
      C                                                                   * FUTILE      23
      C***   INPUT/OUTPUT  ************************************************* FUTILE      24
      C      ------------                                                 * FUTILE      25
      C                                                                   * FUTILE      26
      C***   SUMMARY OF SYMBOLS  ******************************************* FUTILE      27
      C      ------------------                                           * FUTILE      28
      C                                                                   * FUTILE      29
      C***   ERROR MESSAGES  *********************************************** FUTILE      30
      C      --------------                                               * FUTILE      31
      C      NONE.                                                        * FUTILE      32
      C                                                                   * FUTILE      33
      C********************************************************************** FUTILE      34
             SUBROUTINE FUTILE (A,N,NIX)                                    FUTILE      35
      C                                                                     FUTILE      36
      CIBM   BEGINNING OF TYPE STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS FUTILE      37
      C      DOUBLE PRECISION SUM                                           FUTILE      38
      CIBM   ENDING OF TYPE STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS    FUTILE      39
      C                                                                     FUTILE      40
             DIMENSION A(1)                                                 FUTILE      41
      C                                                                     FUTILE      42
             EQUIVALENCE (SUN,SUM)                                          FUTILE      43
      C                                                                     FUTILE      44
      C                                                                     FUTILE      45
      C FUNCTION DEFINITION                                                  FUTILE      46
             SQRTF(X)      =  SQRT(X)                                       FUTILE      47
      C                                                                     FUTILE      48
             K1 = 1                                                         FUTILE      49
             KK = 0                                                         FUTILE      50
             DO 210 K=1,N                                                   FUTILE      51
             KK = KK+K                                                      FUTILE      52
             IK = KK                                                        FUTILE      53
             KK1 = KK-1                                                     FUTILE      54
             IF (KK1) 60,50,60                                              FUTILE      55
          50 ASSIGN 100 TO LEAP                                             FUTILE      56
             GO TO 70                                                       FUTILE      57
          60 ASSIGN 80 TO LEAP                                              FUTILE      58
```

```
STATEMENT LABELS               DEF LINE   REFERENCES
   45  125                         61         50
   47  130                         62         48
   52  140                         63         61
   54  145                         64         73
    0  150          INACTIVE       68         2*67
    0  160                         72         70
  101  170                         75         2*61        67

LOOPS  LABEL    INDEX      FROM-TO     LENGTH    PROPERTIES
   21  120      I            52 60        24B                 NOT INNER
   32  110      J            56 58         4B     INSTACK
   74  160      J            70 72         3B     INSTACK

EQUIV CLASSES    LENGTH     MEMBERS - BIAS NAME(LENGTH)
       SUN          1                 0 SUM    (1)

STATISTICS
  PROGRAM LENGTH                121B      81
         52000B CM USED
```

```
      SUBROUTINE TRIEQ       74/74    OPT=1                                  FTN 4.8+577          85/01/23. 08.10.44        PAGE      2

                     110 IJ = IJ+1                                                                TRIEQ       59
                         II = IJ                                                                  TRIEQ       60
 60                  120 Y(I+1) = -SUM/A(II)                                                      TRIEQ       61
                     125 IF (INDIC8) 170,140,170                                                  TRIEQ       62
                     130 II = (M*M+M)/2-LM1                                                       TRIEQ       63
                     140 I = M                                                                    TRIEQ       64
                     145 Y(I) = Y(I)/A(II)                                                        TRIEQ       65
 65                      II = II-I                                                                TRIEQ       66
                         I = I-1                                                                  TRIEQ       67
                         IF (I-L1) 170,150,150                                                    TRIEQ       68
                     150 SUN = -Y(I+1)                                                            TRIEQ       69
                         IJ = II+L1                                                               TRIEQ       70
 70                      DO 160 J=L1,I                                                            TRIEQ       71
                         Y(J) = Y(J)+SUN*A(IJ)                                                    TRIEQ       72
                     160 IJ = IJ+1                                                                TRIEQ       73
                         GO TO 145                                                                TRIEQ       74
                   C                                                                              TRIEQ       75
 75                  170 RETURN                                                                   TRIEQ       76
                         END                                                                      TRIEQ       77


      SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS      DEF LINE      REFERENCES
    3  TRIEQ          33           75

VARIABLES       SN  TYPE            RELOCATION
    O  A            REAL       ARRAY     F.P.        REFS        40        49        57        60        64        71
                                                  DEFINED        33
  106  I            INTEGER                          REFS        53        54        56        60      2*64        65        66
                                                       67        68        70   DEFINED        52        63        66
  111  II           INTEGER                          REFS        60        64        65        69   DEFINED        59        62
                                                       65
  107  IJ           INTEGER                          REFS        57        58        59        71        72
                                                  DEFINED        55        58        69        72
    O  INDIC8       INTEGER              F.P.        REFS        48        61   DEFINED        33
  105  I1           INTEGER                          REFS        53        55   DEFINED        51        53
  110  J            INTEGER                          REFS        57      2*71   DEFINED        56        70
    O  L            INTEGER              F.P.        REFS        45   DEFINED        33
  103  LM1          INTEGER                          REFS        62   DEFINED        46
  102  L1           INTEGER                          REFS        46      3*49        51        52        56        67        69
                                                       70   DEFINED        45
    O  M            INTEGER              F.P.        REFS        47      3*62        63   DEFINED        33
  104  MM1          INTEGER                          REFS        50        52   DEFINED        47
  112  SUM          REAL                             REFS        43        57        60   DEFINED        54        57
  112  SUN          REAL                             REFS        43        71   DEFINED        68
    O  Y            REAL       ARRAY     F.P.        REFS        40        49        54        57        64        68        71
                                                  DEFINED        33        49        60        64        71

STATEMENT LABELS             DEF LINE    REFERENCES
    O  100         INACTIVE      49        2*48
    O  105         INACTIVE      51        2*50
    O  110                       58         56
    O  120                       60         52
```

```
C                                                                        VIBRAP   344
      KOUNT=LINES                                                        VIBRAP   345
      CALL TITLES(2)                                                     VIBRAP   346
      WRITE(ITAPEW,9011) BMREF,BEAML,RATIO                               VIBRAP   347
      KOUNT=KOUNT+5                                                      VIBRAP   348
C     MPLOT IS AN ARRAY CONTAINING MODES TO BE PLOTTED                   VIBRAP   349
C                                                                        VIBRAP   350
      READ(ITAPER,9003) NPLOTS                                           VIBRAP   351
      READ(ITAPER,9003) (MPLOT(I),I=1,NPLOTS)                            VIBRAP   352
      CALL PLB(1,3,ITAPEW)                                               VIBRAP   353
      KOUNT=KOUNT+3                                                      VIBRAP   354
      WRITE(ITAPEW,9012) NPLOTS,(MPLOT(I),I=1,NPLOTS)                    VIBRAP   355
      KOUNT=KOUNT+1                                                      VIBRAP   356
C     READ DYNAMIC DOF'S IN THE ORDER IN WHICH THEY WILL BE PLOTTED      VIBRAP   357
C     IN THE DYNAMICS GRID                                               VIBRAP   358
      READ(ITAPER,9003) NCDI                                             VIBRAP   359
      READ(ITAPER,9003) (IDISP(I),I=1,NCDI)                              VIBRAP   360
C                                                                        VIBRAP   361
C     IF MPLOT(K) IS NEGATIVE, MODE PLOT WILL BE MULTIPLIED BY -1        VIBRAP   362
C                                                                        VIBRAP   363
      MODE=0                                                             VIBRAP   364
      DO 21 KNTR=1,NPLOTS                                                VIBRAP   365
      NEXT=MODE+1                                                        VIBRAP   366
      MODE=IABS(MPLOT(KNTR))                                             VIBRAP   367
      DO 48 I=NEXT,MODE                                                  VIBRAP   368
   48 CALL GETROW(IUCOM,1,WORK,NCOL)                                     VIBRAP   369
      IF (KNTR.EQ.1)  GOTO 22                                            VIBRAP   370
      CALL PLOT (HSCLP4, 0., -3)                                         VIBRAP   371
   22 CONTINUE                                                           VIBRAP   372
      XMODNO=MODE                                                        VIBRAP   373
      CALL NUMBER(-.5, 8., .28, XMODNO, 90., -1)                         VIBRAP   374
      JKNTR  =  1                                                        VIBRAP   375
   39 CONTINUE                                                           VIBRAP   376
      L=IDISP(JKNTR)                                                     VIBRAP   377
      VALU=0.0                                                           VIBRAP   378
      IF(L.GE.1.AND.L.LE.NCOL) VALU=WORK(L)                              VIBRAP   379
      DISP(JKNTR)=VALU                                                   VIBRAP   380
      IF (JKNTR .EQ. NCDI) GO TO 44                                      VIBRAP   381
      JKNTR  =   JKNTR + 1                                               VIBRAP   382
      GOTO 39                                                            VIBRAP   383
   44 CONTINUE                                                           VIBRAP   384
      IF (MPLOT(KNTR).GT.0)  GOTO 27                                     VIBRAP   385
      DO 28 IM = 1,NCDI                                                  VIBRAP   386
      DISP(IM) = -DISP(IM)                                               VIBRAP   387
   28 CONTINUE                                                           VIBRAP   388
C                                                                        VIBRAP   389
   27 CONTINUE                                                           VIBRAP   390
      KOUNT=LINES                                                        VIBRAP   391
      NF=0                                                               VIBRAP   392
   90 CONTINUE                                                           VIBRAP   393
      NS=NF+1                                                            VIBRAP   394
      NF=NF+5                                                            VIBRAP   395
      IF(NF.GT.NCDI) NF=NCDI                                             VIBRAP   396
      CALL TITLES(2)                                                     VIBRAP   397
      IF(KOUNT.GT.KOUNTH) GO TO 92                                       VIBRAP   398
      WRITE(ITAPEW,9013) MODE                                            VIBRAP   399
      KOUNT=KOUNT+5                                                      VIBRAP   400
```

```
      92 CONTINUE                                                       VIBRAP   401
         WRITE(ITAPEW,9014) (L,DISP(L),L=NS,NF)                         VIBRAP   402
         KOUNT=KOUNT+1                                                  VIBRAP   403
         IF(NF.LT.NCDI) GO TO 90                                        VIBRAP   404
C                                                                       VIBRAP   405
C                                                                       VIBRAP   406
C        SEARCH FOR THE LARGEST DISPLACEMENT IN ABSOLUTE VALUE          VIBRAP   407
C                                                                       VIBRAP   408
         CALL ARAYMX (DISP, 800, DISPMX)                                VIBRAP   409
C        WRITE (ITAPEW,500)  DISPMX                                     VIBRAP   410
C                                                                       VIBRAP   411
C        MULTIPLY ALL DISPLACEMENTS TO REFLECT NEW RATIO                VIBRAP   412
         RRAT  =  DSPMX1 / DISPMX                                       VIBRAP   413
C        WRITE (ITAPEW,500)  BEAML, DSPMX1, RRAT                        VIBRAP   414
         DO  18  II=1,800                                               VIBRAP   415
         DISP(II)  =  RRAT * DISP(II)                                   VIBRAP   416
C        WRITE (ITAPEW,500)  DISP(II)                                   VIBRAP   417
      18 CONTINUE                                                       VIBRAP   418
C                                                                       VIBRAP   419
         NSUM  = 0                                                      VIBRAP   420
         REWIND MTAP3                                                   VIBRAP   421
         DO 62  I=1,NBEAMS                                              VIBRAP   422
         READ (MTAP3)  WORD1, WORD2,   NPTBM                            VIBRAP   423
         READ (MTAP3)  (JPTS(K),K=1,NPTBM)                              VIBRAP   424
         NPTSBM(I)  =  NPTBM                                            VIBRAP   425
C                                                                       VIBRAP   426
         DO 31  II=1,NPTBM                                              VIBRAP   427
         NUM  =  JPTS(II)                                               VIBRAP   428
         WKAREA(1,II)  =  XPRIM(1,NUM)                                  VIBRAP   429
         WKAREA(2,II)  =  XPRIM(2,NUM)                                  VIBRAP   430
         WKAREA(3,II)  =  XPRIM(3,NUM)                                  VIBRAP   431
         IF (DOF(NUM).EQ.XSYM) GOTO 33                                  VIBRAP   432
         IF (DOF(NUM).EQ.YSYM) GOTO 34                                  VIBRAP   433
         IF (DOF(NUM).EQ.ZSYM) GOTO 35                                  VIBRAP   434
         LEFT=LINES-KOUNT                                               VIBRAP   435
         IF(LEFT.LT.3) KOUNT=LINES                                      VIBRAP   436
         CALL TITLES(2)                                                 VIBRAP   437
         WRITE(ITAPEW,9015) NUM                                         VIBRAP   438
         KOUNT=KOUNT+3                                                  VIBRAP   439
         DISPPT(1,II )  = XPRIM(1,NUM)                                  VIBRAP   440
         DISPPT(2,II )  = XPRIM(2,NUM)                                  VIBRAP   441
         DISPPT(3,II )  = XPRIM(3,NUM)                                  VIBRAP   442
         GO TO 31                                                       VIBRAP   443
      33 DISPPT(1,II )  = XPRIM(1,NUM) - DISP(NUM)                      VIBRAP   444
         DISPPT(2,II )  = XPRIM(2,NUM)                                  VIBRAP   445
         DISPPT(3,II )  = XPRIM(3,NUM)                                  VIBRAP   446
         GO TO 31                                                       VIBRAP   447
      34 DISPPT(2,II )  = XPRIM(2,NUM) + DISP(NUM)                      VIBRAP   448
         DISPPT(1,II )  = XPRIM(1,NUM)                                  VIBRAP   449
         DISPPT(3,II )  = XPRIM(3,NUM)                                  VIBRAP   450
         GO TO 31                                                       VIBRAP   451
      35 DISPPT(3,II )  = XPRIM(3,NUM)  - DISP(NUM)                     VIBRAP   452
         DISPPT(1,II )  = XPRIM(1,NUM)                                  VIBRAP   453
         DISPPT(2,II )  = XPRIM(2,NUM)                                  VIBRAP   454
C        DISPPT IS THE ARRAY CONTAINING THE COORDINATES OF THE          VIBRAP   455
C        DISPLACED PTS. ON THE GIVEN BEAM                               VIBRAP   456
      31 CONTINUE                                                       VIBRAP   457
```

```
C     WRITE(6,500)  ((WKAREA(K1,K2),K1=1,3),K2=1,NPTBM)
C     WRITE (ITAPEW,500)  (DISPPT(1,II),DISPPT(2,II),DISPPT(3,II),
C    1                                                   II=1,NPTBM)
      IF (NPTBM.EQ.2)  GO TO 11
C
      JUMP  =  6
C
C     24/JUMP DEFINES THE NUMBER OF SPACES BETWEEN ADJACENT PTS USED
C     TO DRAW        THE CURVE THRU THE UNDEFORMED BEAM
C
      NCOORD(I)  =  (NPTBM - 1) * 24 / JUMP + 1
C
C     NCOORD IS THE NUMBER OF POINTS NEEDED TO DEFINE THE CURVE
C     THROUGH THE UNDEFORMED BEAM
C     COORD IS THE (3,NCOORD) ARRAY CONTAINING THE COORDINATES
C     OF THE CURVE THROUGH THE UNDEFORMED BEAM
C
      N1  =  NCOORD(I)
      CALL FERGCV (JUMP,WKAREA,NPTBM,COORD,N1)
C     WRITE (ITAPEW,500)  ((COORD(II,J),II=1,3),J=1,N1)
      DO 32  II=1,N1
C     TRANSFORM TOTHE Y-Z PLANE
      CALL CLCORD  (PROD, COORD(1,II), SCRT2)
      XX(II)  =  SCRT2(1)
      XX2(II)  =  SCRT2(2)
C     WRITE (ITAPEW,500) SCRT2(1),SCRT2(2)
   32 CONTINUE
C
      GO TO 12
   11 DO 13  II=1,2
      CALL CLCORD (PROD, WKAREA(1,II), SCRT2)
      XX(II)  =  SCRT2(1)
      XX2(II)  =  SCRT2(2)
C     WRITE (ITAPEW,500)  SCRT2(1),  SCRT2(2)
   13 CONTINUE
      NCOORD(I)  = 2
      N1   =  NCOORD(I)
C
   12 CONTINUE
C
C
C     DEFINE COORDINATES OF DISPLACEMENT LINE FOR EACH POINT ON THE BEAM
C
      INDX   =  NPTBM + 1
      DO 41  II=1,NPTBM
      IND1  =  INDX  - II
      NUM  =  JPTS(IND1)
      CALL CLCORD  (PROD, XPRIM(1,NUM), SCRT2)
      XX(N1   + 2*II - 1)  =  SCRT2(1)
      XX2(N1   + 2*II -1)  =  SCRT2(2)
C     WRITE (ITAPEW,500) SCRT2(1),SCRT2(2)
      CALL CLCORD  (PROD, DISPPT(1,IND1), SCRT2)
      XX(N1   + 2*II)  =  SCRT2(1)
      XX2(N1   + 2*II)  =  SCRT2(2)
C     WRITE (ITAPEW,500) SCRT2(1),SCRT2(2)
   41 CONTINUE
```

```
      C                                                              VIBRAP  515
      C     NOW DEFINE CURVE THROUGH THE DEFORMED BEAM               VIBRAP  516
            IF (NPTBM.EQ.2)  GO TO 14                                VIBRAP  517
            JUMP  =  1                                               VIBRAP  518
            NCDEF(I)  =  (NPTBM - 1) * 24 /JUMP  +  1                VIBRAP  519
            N2   =  NCDEF(I)                                         VIBRAP  520
            CALL FERGCV (JUMP,DISPPT,NPTBM,COORD,N2)                 VIBRAP  521
            DO 38  II=1,N2                                           VIBRAP  522
            CALL CLCORD  (PROD, COORD(1,II),  SCRT2)                 VIBRAP  523
            XX(N1 + 2*NPTBM + II)  =  SCRT2(1)                       VIBRAP  524
            XX2(N1 + 2*NPTBM + II)  =  SCRT2(2)                      VIBRAP  525
      C     WRITE (ITAPEW,500) SCRT2(1),SCRT2(2)                     VIBRAP  526
         38 CONTINUE                                                 VIBRAP  527
      C                                                              VIBRAP  528
            GO TO 15                                                 VIBRAP  529
         14 DO 16  II=1,2                                            VIBRAP  530
            CALL CLCORD (PROD,  DISPPT(1,II),  SCRT2)                VIBRAP  531
            XX(N1 + 2*NPTBM + II)  =  SCRT2(1)                       VIBRAP  532
            XX2(N1 + 2*NPTBM + II)  =  SCRT2(2)                      VIBRAP  533
      C     WRITE (ITAPEW,500) SCRT2(1),SCRT2(2)                     VIBRAP  534
         16 CONTINUE                                                 VIBRAP  535
            NCDEF(I)  =  2                                           VIBRAP  536
      C                                                              VIBRAP  537
         15 CONTINUE                                                 VIBRAP  538
      C                                                              VIBRAP  539
      C                                                              VIBRAP  540
            NSUM = NCOORD(I) + 2*NPTSBM(I)  +  NCDEF(I)              VIBRAP  541
      C                                                              VIBRAP  542
      C                                                              VIBRAP  543
      C                                                              VIBRAP  544
      C     WRITE UNSCALED VALUES OF Y ON UNIT MTAP1                 VIBRAP  545
      C                                                              VIBRAP  546
            DO 53  M=1,NSUM                                          VIBRAP  547
            WRITE (MTAP1)  XX(M)                                     VIBRAP  548
      C     WRITE (ITAPEW,500)  XX(M)                                VIBRAP  549
         53 CONTINUE                                                 VIBRAP  550
      C                                                              VIBRAP  551
      C                                                              VIBRAP  552
      C     WRITE ORIGINAL VALUES OF  Z ON UNIT MTAP2                VIBRAP  553
      C                                                              VIBRAP  554
            DO 56  M=1,NSUM                                          VIBRAP  555
            WRITE (MTAP2) XX2(M)                                     VIBRAP  556
      C     WRITE (ITAPEW,500) XX2(M)                                VIBRAP  557
         56 CONTINUE                                                 VIBRAP  558
      C                                                              VIBRAP  559
            IF (KNTR .GT. 1) GOTO 62                                 VIBRAP  560
      C                                                              VIBRAP  561
      C                                                              VIBRAP  562
      C     COMPUTE LARGEST AND SMALLEST VALUES OF UNSCALED Y'S      VIBRAP  563
      C           (HORIZONTAL SCALE VARIABLES)                       VIBRAP  564
      C                                                              VIBRAP  565
            CALL ARAYMN (XX, NCOORD(I), YMIN(I))                     VIBRAP  566
            CALL MAX    (XX, NCOORD(I), YMAX(I))                     VIBRAP  567
      C                                                              VIBRAP  568
      C                                                              VIBRAP  569
      C     WRITE (ITAPEW, 500)  YMIN(I)                             VIBRAP  570
      C     WRITE (ITAPEW, 500) YMAX(I)                              VIBRAP  571
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```
      C     WRITE (ITAPEW, 500) (XX(II),II=1,NSUM)                       VIBRAP    572
      C                                                                  VIBRAP    573
      C                                                                  VIBRAP    574
      C     COMPUTE LARGEST AND SMALLEST VALUES OF UNSCALED Z'S          VIBRAP    575
      C           (VERTICAL SCALE VARIABLES)                             VIBRAP    576
      C                                                                  VIBRAP    577
            CALL ARAYMN (XX2, NCOORD(I), ZMIN(I))                        VIBRAP    578
            CALL MAX    (XX2, NCOORD(I), ZMAX(I))                        VIBRAP    579
      C                                                                  VIBRAP    580
      C     WRITE (ITAPEW, 500)  ZMIN(I)                                 VIBRAP    581
      C     WRITE (ITAPEW, 500)  ZMAX(I)                                 VIBRAP    582
      C     WRITE (ITAPEW, 500)  (XX2(II),II=1,NSUM)                     VIBRAP    583
      C                                                                  VIBRAP    584
      C                                                                  VIBRAP    585
         62 CONTINUE                                                     VIBRAP    586
      C                                                                  VIBRAP    587
            REWIND MTAP1                                                 VIBRAP    588
            REWIND MTAP2                                                 VIBRAP    589
      C                                                                  VIBRAP    590
            IF (KNTR .GT.1) GOTO 68                                      VIBRAP    591
      C     COMPUTE LARGEST  Y  AND  Z  VALUES FOR ALL BEAMS             VIBRAP    592
      C            (TO BE USED IN SCALING)                               VIBRAP    593
      C                                                                  VIBRAP    594
            CALL MAX (YMAX, NBEAMS, BGSTY)                               VIBRAP    595
            CALL MAX (ZMAX, NBEAMS, BGSTZ)                               VIBRAP    596
      C     WRITE (ITAPEW,500)  BGSTY, BGSTZ                             VIBRAP    597
      C                                                                  VIBRAP    598
      C     COMPUTE SMALLEST  Y  AND  Z  VALUES FOR ALL BEAMS            VIBRAP    599
      C             (TO BE USED IN SCALING)                              VIBRAP    600
      C                                                                  VIBRAP    601
            CALL ARAYMN (YMIN  , NBEAMS, SMLSTY)                         VIBRAP    602
            CALL ARAYMN (ZMIN  , NBEAMS, SMLSTZ)                         VIBRAP    603
      C     WRITE (ITAPEW,500)  SMLSTY,  SMLSTZ                          VIBRAP    604
      C                                                                  VIBRAP    605
            DY  =  (BGSTY - SMLSTY) / HSCALE                             VIBRAP    606
            DZ  = (BGSTZ - SMLSTZ + 2.*ABS(DSPMX1*PROD(2,3)))/ VSCALE    VIBRAP    607
      C                                                                  VIBRAP    608
            DSCALC  =  DY                                                VIBRAP    609
            IF (DZ .GT. DY)  DSCALC  =  DZ                               VIBRAP    610
            SHIFT  =  (10.0 - (DZ*VSCALE/DY)) / 2.                       VIBRAP    611
            IF (DZ .GT. DY)  SHIFT  =  (10.0 - VSCALE) / 2.              VIBRAP    612
      C     WRITE (ITAPEW, 500)  DY, DZ                                  VIBRAP    613
      C                                                                  VIBRAP    614
         68  CONTINUE                                                    VIBRAP    615
      C                                                                  VIBRAP    616
      C                                                                  VIBRAP    617
      CIBM  BEGINNING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS VIBRAP    618
      C     UNSCALED  Y  AND  Z  VALUES ARE READ OFF MTAP1 AND MTAP2     VIBRAP    619
      C     SCALED AND REWRITTEN ON MTAP8 AND MTAP9.                     VIBRAP    620
      C                                                                  VIBRAP    621
      C     DO 80  I=1,NBEAMS                                            VIBRAP    622
      C     NPTS  =  2*NPTSBM(I)  +  NCOORD(I)  +  NCDEF(I)              VIBRAP    623
      C     DO 81  II=1,NPTS                                             VIBRAP    624
      C     READ (MTAP1)  YY                                             VIBRAP    625
      C     YY  =  (YY - SMLSTY) / DSCALC                                VIBRAP    626
      C     WRITE (ITAPEW,500)  YY                                       VIBRAP    627
      C     WRITE (MTAP8)  YY                                            VIBRAP    628
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      C      READ  (MTAP2)  YY                                          VIBRAP    629
      C      YY =  (YY - (SMLSTZ - ABS(DSPMX1*PROD(2,3))))/DSCALC + SHIFT VIBRAP  630
      C      WRITE (ITAPEW,500)  YY                                     VIBRAP    631
      C      WRITE (MTAP9)  YY                                          VIBRAP    632
      C   81 CONTINUE                                                   VIBRAP    633
      C   80 CONTINUE                                                   VIBRAP    634
      C      REWIND MTAP1                                               VIBRAP    635
      C      REWIND MTAP2                                               VIBRAP    636
      C      REWIND MTAP8                                               VIBRAP    637
      C      REWIND MTAP9                                               VIBRAP    638
      CIBM   ENDING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS VIBRAP    639
      C                                                                 VIBRAP    640
      C                                                                 VIBRAP    641
      C                                                                 VIBRAP    642
      C      BEAMS ARE PLOTTED ONE AT A TIME                            VIBRAP    643
      C                                                                 VIBRAP    644
      C                                                                 VIBRAP    645
             DO  60  I=1,NBEAMS                                         VIBRAP    646
             NPTS  =  NCOORD(I)                                         VIBRAP    647
      C                                                                 VIBRAP    648
      C      PLOT THE CURVE THROUGH THE UNDEFORMED BEAM   FIRST         VIBRAP    649
      C                                                                 VIBRAP    650
      CIBM   BEGINNING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS VIBRAP 651
      C      DO  61  M=1,NPTS                                           VIBRAP    652
      C      READ (MTAP8)  U(M)                                         VIBRAP    653
      C      READ (MTAP9)  V(M)                                         VIBRAP    654
      C      WRITE (ITAPEW,500)  U(M),   V(M)                           VIBRAP    655
      C   61 CONTINUE                                                   VIBRAP    656
      C      CALL  LINE (U,V,NPTS,1,1,1,JL,S)                           VIBRAP    657
      CIBM   ENDING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS VIBRAP    658
      C                                                                 VIBRAP    659
      C                                                                 VIBRAP    660
      CCDC   BEGINNING OF STATEMENTS ASSOCIATED WITH CDC COMPUTER PROGRAMS VIBRAP 661
                                                                        VIBRAP    662
             U(NPTS+1)=SMLSTY                                           VIBRAP    663
             U(NPTS+2)=DSCALC                                           VIBRAP    664
             V(NPTS+1)=SMLSTZ - ABS(DSPMX1 *PROD(2,3)) - SHIFT*DSCALC   VIBRAP    665
             V(NPTS+2)=DSCALC                                           VIBRAP    666
                                                                        VIBRAP    667
             DO 61 M=1,NPTS                                             VIBRAP    668
             READ(MTAP1) U(M)                                           VIBRAP    669
             READ(MTAP2) V(M)                                           VIBRAP    670
          61 CONTINUE                                                   VIBRAP    671
             CALL LINE(U,V,NPTS,1,0,LM)                                 VIBRAP    672
                                                                        VIBRAP    673
      CCDC   ENDING OF STATEMENTS ASSOCIATED WITH CDC COMPUTER PROGRAMS VIBRAP    674
      C                                                                 VIBRAP    675
      C      PLOT STRAIGHT LINE THROUGH UNDEFORMED & DEFORMED POINTS    VIBRAP    676
      C                                                                 VIBRAP    677
             NPTBMI  =  NPTSBM(I)                                       VIBRAP    678
             DO 71  II = 1,NPTBMI                                       VIBRAP    679
      C                                                                 VIBRAP    680
      CIBM   BEGINNING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS VIBRAP 681
      C      READ (MTAP8)  U(1)                                         VIBRAP    682
      C      READ (MTAP9)  V(1)                                         VIBRAP    683
      C      READ (MTAP8)  U(2)                                         VIBRAP    684
      C      READ (MTAP9)  V(2)                                         VIBRAP    685
```

```
CIBM  ENDING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS
C
CCDC  BEGINNING OF STATEMENTS ASSOCIATED WITH CDC COMPUTER PROGRAMS
      READ(MTAP1) U(1)
      READ(MTAP2) V(1)
      READ(MTAP1) U(2)
      READ(MTAP2) V(2)
      U(1)   =  (U(1) - SMLSTY)/DSCALC
      U(2)   =  (U(2) - SMLSTY)/DSCALC
      V(1)   =  (V(1) - (SMLSTZ - ABS(DSPMX1*PROD(2,3))
     1                - SHIFT*DSCALC))/DSCALC
      V(2)   =  (V(2) - (SMLSTZ - ABS(DSPMX1*PROD(2,3))
     1                - SHIFT*DSCALC))/DSCALC
CCDC  ENDING OF STATEMENTS ASSOCIATED WITH CDC COMPUTER PROGRAMS
C
      DIST  =  SQRT((V(2) - V(1))**2 + (U(2) - U(1))**2)
C     WRITE (ITAPEW,500)    DIST
      NCYCL  =  DIST / (DASH + BLANK)
C     WRITE (ITAPEW, 1000)  NCYCL
      IF (NCYCL.EQ.0) GO TO 72
C     AT LEAST ONE DASH AND BLANK WILL BE DRAWN
      ARG1  =  V(2) - V(1)
      ARG2  =  U(2) - U(1)
      ANGLE  =  ATAN2 (ARG1, ARG2)
      CALL PLOT (U(1),V(1),3)
C     WRITE (ITAPEW,500)    ANGLE
      DO 73  IJ=1,NCYCL
      IF (IJ.EQ.1)  ULL =  U(1)
      IF (IJ.EQ.1)  VLL =  V(1)
      UUL =  ULL+ 0.14 * COS (ANGLE)
      VUL =  VLL+ 0.14 * SIN (ANGLE)
C     WRITE (ITAPEW,500)    ULL,VLL, UUL, VUL
      CALL PLOT (UUL, VUL, 2)
      UUL =  UUL+ .07 * COS (ANGLE)
      VUL =  VUL+ .07 * SIN (ANGLE)
C     WRITE (ITAPEW,500)    ULL, VLL, UUL, VUL
      CALL PLOT (UUL, VUL, 3)
      ULL =   UUL
      VLL =  VUL
   73 CONTINUE
      CALL PLOT (U(2),V(2),2)
      GO TO 71
C     WRITE (ITAPEW,500)  U(1),  V(1),  U(2), V(2)
C
   72 CONTINUE
      CALL PLOT (U(1),V(1),3)
      CALL PLOT (U(2),V(2),2)
C
   71 CONTINUE
C
C     DRAW A HEAVY CURVE THROUGH THE DEFORMED BEAM
C
C     FIRST READ POINTS DEFINING THE DEFORMED BEAM FROM I/O UNIT
C
      NPTS  = NCDEF(I)
C
CIBM  BEGINNING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS
```

```
C      DO 63   II=1,NPTS
C      READ (MTAP8)  U(II)
C      READ (MTAP9)   V(II)
C      WRITE (ITAPEW,500)  U(II),  V(II)
C  63 CONTINUE
CIBM  ENDING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS
C
CCDC  BEGINNING OF STATEMENTS ASSOCIATED WITH CDC COMPUTER PROGRAMS

      DO 63 II=1,NPTS
      READ(MTAP1) U(II)
      READ(MTAP2) V(II)
   63 CONTINUE
CCDC  ENDING OF STATEMENTS ASSOCIATED WITH CDC COMPUTER PROGRAMS
C
C
C     NEXT DRAW THREE CURVES EACH SLIGHTLY DISPLACED FROM ONE ANOTHER
C     THROUGH THE DEFORMED BEAM
C
      NPTSM1  =  NPTS - 1
      DO  64  K=1,NPTSM1
      DO 65  J=1,3
      IF (J.EQ.1)  GOTO 66
      ARG1  =  V(K+1)  - V(K)
      ARG2  =  U(K+1)  - U(K)
      ANGLE  =  ATAN2  (ARG1, ARG2)
      DU  =   .005 * SIN(ANGLE)
      DV  =   .005 * COS(ANGLE)
      IF (J.EQ.3)  DU  =  -DU
      IF (J.EQ.3)  DV  =  -DV
      GO TO 67
   66 DU  = O
      DV  = O.
C
CIBM  BEGINNING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS
C  67 U1(2)  = U(K+1)  - DU
C     V1(2)  =  V(K+1)  + DV
C     U1(1)  =  U(K) - DU
C     V1(1)  =  V(K) + DV
C     CALL LINE  (U1,V1,2,1,1,1,JL,S)
CIBM  ENDING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS
C
CCDC  BEGINNING OF STATEMENTS ASSOCIATED WITH CDC COMPUTER PROGRAMS
   67 CONTINUE
      U1(2)  =  U(K+1) - DU*DSCALC
      V1(2)  =  V(K+1) + DV*DSCALC
      U1(1)  =  U(K)   - DU*DSCALC
      V1(1)  =  V(K)   + DV*DSCALC
      U1(3)  =  SMLSTY
      U1(4)  =  DSCALC
      V1(3)  =  SMLSTZ - ABS(DSPMX1*PROD(2,3)) - SHIFT*DSCALC
      V1(4)  =  DSCALC
      CALL LINE(U1,V1,2,1,0,LM)
CCDC  ENDING OF STATEMENTS ASSOCIATED WITH CDC COMPUTER PROGRAMS
C
   65 CONTINUE
   64 CONTINUE
```

```
C
C
   60 CONTINUE
C
CIBM  BEGINNING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS
C     REWIND MTAP8
C     REWIND  MTAP9
CIBM  ENDING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS
C
CCDC
      REWIND MTAP1
      REWIND MTAP2
CCDC
C
   21 CONTINUE
C
      CALL DCLOSE(IUCOM)
C
C TERMINATE PLOTTING
C
      CALL PLOT(HSCLP4, O., -3)
      IF (KPLOTF .EQ. YES) GO TO 9500
      LEFT=LINES-KOUNT
      IF(LEFT.LT.2) KOUNT=LINES
      CALL TITLES (2)
      CALL PLB (1,1,ITAPEW)
      WRITE(ITAPEW,9017)
      KOUNT=KOUNT+2
 9500 CONTINUE
C
      CALL TIMEB (36,36HFROM VIBRAP - PLOT VIBRATION RESULTS)
C
C
C     FORMATS
C
 9000 FORMAT(18A4)
 9001 FORMAT(10X,18A4)
 9002 FORMAT(3E15.5)
 9003 FORMAT(10I5)
 9004 FORMAT(10X,10(1H*),  25HGEOMETRY OF PLOTTING GRID,10(1H*),
     1    //,10X,3H PT,16X,1HX,20X,1HY,20X,1HZ,15X,3HDOF,/)
 9005 FORMAT(I5,3E15.5,1X,A4)
 9006 FORMAT(10X,I3,3(10X,1PE11.4),10X,A4)
 9007 FORMAT(2A4,2X,E10.3)
 9008 FORMAT(2A4,2X,I5)
 9009 FORMAT(/,10X,10(1H*),16HBEAM DEFINITIONS,10(1H*),
     1       //,10X,5H  NO.,3X,5HTITLE, 8X,16HCONNECTING NODES,84(1H.),/)
 9010 FORMAT(10X,I5,3X,2A4,5X,20I5)
 9011 FORMAT(/,10X,   29HTHE SELECTED REFERENCE BEAM (,2A4,
     1                18H) HAS A LENGTH OF ,F10.3,
     2       //,10X,  44HRATIO OF MAX DISPLACEMENT TO REFERENCE BEAM ,
     3                 8HLENGTH =,F8.3,/)
 9012 FORMAT (10X, 13HTHE FOLLOWING, I3,,2X,25HMODES WILL BE PLOTTED...
     1       ,/,(10X, 14I5))
 9013 FORMAT(/,10X,10(1H*),29HDISPLACEMENTS FOR MODE NUMBER,I3.1H .
     1              10(1H*),
     2       //,10X, 5(22H      PT   DISPLACEMENT),/)
```

```
      9014 FORMAT(10X,5(I7,1PE15.5))                                   VIBRAP    857
      9015 FORMAT(/,10X,    25HTHE DISPLACEMENT AT POINT,I4,           VIBRAP    858
         1                  34H CANNOT BE CLASSIFIED AS X,Y OR Z.,     VIBRAP    859
         2                  37H CHECK THE INPUT DATA FOR THIS POINT.,  VIBRAP    860
         3        /,10X,    45H ACCORDINGLY, THE DISPLACEMENT WILL BE SET TO,  VIBRAP    861
         4                   6H ZERO.)                                 VIBRAP    862
      9016 FORMAT(10X,37HINITIALIZE PLOTTING IN PROGRAM VIBRAP)        VIBRAP    863
      9017 FORMAT(10X,36HTERMINATE PLOTTING IN PROGRAM VIBRAP)         VIBRAP    864
     C                                                                 VIBRAP    865
     C                                                                 VIBRAP    866
           RETURN                                                      VIBRAP    867
           END                                                         VIBRAP    868


   SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS      DEF LINE     REFERENCES
    3  VIBRAP        1          866

VARIABLES       SN  TYPE          RELOCATION
  2727  A          REAL      ARRAY             REFS       28      86     175     256  DEFINED     232     233
                                                234      235     236
  2716  ANGLE      REAL                        REFS      714     715     718     719     768     769
                                            DEFINED      708     767
  2714  ARG1       REAL                        REFS      708     767  DEFINED     706     765
  2715  ARG2       REAL                        REFS      708     767  DEFINED     707     766
  2740  B          REAL      ARRAY             REFS       28      86     176     253  DEFINED     239     240
                                                241      242     243
  2642  BEAML      REAL                        REFS      328     346  DEFINED     327
  2641  BEAML2     REAL                        REFS      327  DEFINED     326
  2677  BGSTY      REAL                        REFS      594     605
  2700  BGSTZ      REAL                        REFS      595     606
  2577  BLANK      REAL                        REFS      702  DEFINED     116
 10424  BMREF      REAL      ARRAY             REFS       29   2*318     346  DEFINED     295
  7424  BUFFER     REAL      ARRAY             REFS       25     161
  2751  C          REAL      ARRAY             REFS       28      87     177     253  DEFINED     246     247
                                                248      249     250
  4671  COORD      REAL      ARRAY             REFS       43    2*84     187     475     479     520     522
  2576  DASH       REAL                        REFS      702  DEFINED     115
  2617  DEGTOR     REAL                        REFS      225     226     227  DEFINED     224
 10426  DISP       REAL      ARRAY             REFS       30     189     386     401     408     415     443
                                                447      451  DEFINED     379     386     415
  2664  DISPMX     REAL                        REFS      408     412
 13526  DISPPT     REAL      ARRAY             REFS       31     188     508     520     530
                                            DEFINED      439     440     441     443     444     445     447
                                                448      449     451     452     453
  2712  DIST       REAL                        REFS      702  DEFINED     700
 12066  DOF        REAL      ARRAY             REFS       30     190     289     431     432     433
                                            DEFINED      283
  2705  DSCALC     REAL                        REFS      663     664     665     692     693   2*694   2*696
                                                786      787     788     789     791     792     793
                                            DEFINED      608     609
  2643  DSPMX1     REAL                        REFS      412     606     664     694     696     792
```

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VARIABLES      SN  TYPE            RELOCATION
  2725  DU         REAL                        REFS       770      786      788  DEFINED      768      770      773
  2726  DV         REAL                        REFS       771      787      789  DEFINED      769      771      774
  2703  DY         REAL                        REFS       608      609      610      611  DEFINED      605
  2704  DZ         REAL                        REFS     2*609      610      611  DEFINED      606
  2600  HSCALE     REAL                        REFS       124      605  DEFINED      122
  2602  HSCLP4     REAL                        REFS       370      819  DEFINED      124
  2603  I          INTEGER                     REFS     2*262      313      351      354      359      424      467
                                                474       492      493      518      519      535    3*540    2*565
                                              2*566     2*577    2*578      646      677      739
                                            DEFINED       141      260      282      305      351      354      359
                                                367       421      645
  2604  IBUFD      INTEGER                     REFS       161  DEFINED      158
 13622  IDISP      INTEGER   ARRAY             REFS        32      376  DEFINED      359
    21  IFA        INTEGER         PLACES      REFS        61
    67  IFADD      INTEGER         PLACES      REFS        61
    41  IFADDI     INTEGER         PLACES      REFS        61
    33  IFB        INTEGER         PLACES      REFS        61
    71  IFBAL      INTEGER         PLACES      REFS        61
    43  IFBALI     INTEGER         PLACES      REFS        61
   117  IFBR       INTEGER         PLACES      REFS        61
    53  IFBT       INTEGER         PLACES      REFS        61
  2645  IFCOM      INTEGER                     REFS       341  DEFINED      337      339
    73  IFDESF     INTEGER         PLACES      REFS        61
    45  IFDESI     INTEGER         PLACES      REFS        61
    55  IFDESN     INTEGER         PLACES      REFS        61
    35  IFDESO     INTEGER         PLACES      REFS        61
    21  IFDLT      INTEGER         PLAYFF      REFS        78
     3  IFDLTI     INTEGER         PLAYFF      REFS        78
    77  IFDUM1     INTEGER         PLACES      REFS        61
   101  IFDUM2     INTEGER         PLACES      REFS        61
   103  IFDUM3     INTEGER         PLACES      REFS        61
   141  IFINCK     INTEGER         PLACES      REFS        61
   137  IFINCM     INTEGER         PLACES      REFS        61
    31  IFKS       INTEGER         PLACES      REFS        61
   105  IFL        INTEGER         PLACES      REFS        61
   115  IFLR       INTEGER         PLACES      REFS        61
    57  IFMD       INTEGER         PLACES      REFS        61
    65  IFMDB      INTEGER         PLACES      REFS        61
    37  IFMDBI     INTEGER         PLACES      REFS        61
     1  IFMDFF     INTEGER         PLAYFF      REFS        78
    61  IFMEMF     INTEGER         PLACES      REFS        61
    25  IFMEMN     INTEGER         PLACES      REFS        61
    51  IFMEMO     INTEGER         PLACES      REFS        61
   125  IFMODK     INTEGER         PLACES      REFS        61
   123  IFMODM     INTEGER         PLACES      REFS        61
    15  IFMPL      INTEGER         PLAYFF      REFS        78
     7  IFMPLI     INTEGER         PLAYFF      REFS        78
    13  IFPATF     INTEGER         PLAYFF      REFS        78      339
   135  IFPH       INTEGER         PLACES      REFS        61
    27  IFPHA      INTEGER         PLAYFF      REFS        78
    31  IFPHAT     INTEGER         PLAYFF      REFS        78
   127  IFPHT      INTEGER         PLACES      REFS        61
   121  IFPHTF     INTEGER         PLACES      REFS        61      337
   133  IFQ        INTEGER         PLACES      REFS        61
    23  IFQA       INTEGER         PLAYFF      REFS        78
    25  IFQAT      INTEGER         PLAYFF      REFS        78
   131  IFQT       INTEGER         PLACES      REFS        61
```

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VARIABLES      SN  TYPE                RELOCATION
    11  IFSCR      INTEGER                  PLACES     REFS          61
    17  IFSLT      INTEGER                  PLAYFF     REFS          78
     5  IFSLTI     INTEGER                  PLAYFF     REFS          78
    27  IFSTFN     INTEGER                  PLACES     REFS          61
    63  IFSTFO     INTEGER                  PLACES     REFS          61
    12  IFS1       INTEGER                  PLACES     REFS          61
    13  IFS2       INTEGER                  PLACES     REFS          61
    14  IFS3       INTEGER                  PLACES     REFS          61
    15  IFS4       INTEGER                  PLACES     REFS          61
    11  IFTPGT     INTEGER                  PLAYFF     REFS          78
    75  IFWT       INTEGER                  PLACES     REFS          61
    47  IFWTI      INTEGER                  PLACES     REFS          61
    23  IFY        INTEGER                  PLACES     REFS          61
   107  IFYT       INTEGER                  PLACES     REFS          61
   111  IFZ        INTEGER                  PLACES     REFS          61
   113  IFZR       INTEGER                  PLACES     REFS          61
  2666  II         INTEGER                             REFS       2*415       427       428       429       430       439       440
                                                            441     443       444       445       447       448       449       451
                                                            452     453       479       480       481       487       488       489
                                                            502     505       506       509       510       522       523       524
                                                            530     531       532       752       753   DEFINED       414       426
                                                            477     486       501       521       529       678       751
  2717  IJ         INTEGER                             REFS         712       713   DEFINED       711
  2661  IM         INTEGER                             REFS       2*386   DEFINED       385
  2673  INDX       INTEGER                             REFS         502   DEFINED       500
  2674  IND1       INTEGER                             REFS         503       508   DEFINED       502
     2  ITAPEP     INTEGER                  COMRWP     REFS          53
     0  ITAPER     INTEGER                  COMRWP     REFS          53  I/O REFS        94        95       142       222       274
                                                            283     295       302       306       307       350       351       358
                                                            359
     0  ITAPES     INTEGER        ARRAY     CTAPES     REFS          33        54       102       103       104       105
     7  ITAPET     INTEGER                  CTABLE     REFS          59
     1  ITAPEW     INTEGER                  COMRWP     REFS          53       149       277       352       824
                                                       I/O REFS     143       150       279       286       289       310       313
                                                            346     354       398       401       437       825
  2605  ITAP60     INTEGER                             REFS         161   DEFINED       159  I/O REFS       160
    20  IUA        INTEGER                  PLACES     REFS          61
    66  IUADD      INTEGER                  PLACES     REFS          61
    40  IUADDI     INTEGER                  PLACES     REFS          61
    32  IUB        INTEGER                  PLACES     REFS          61
    70  IUBAL      INTEGER                  PLACES     REFS          61
    42  IUBALI     INTEGER                  PLACES     REFS          61
   116  IUBR       INTEGER                  PLACES     REFS          61
    52  IUBT       INTEGER                  PLACES     REFS          61
    16  IUCD       INTEGER                  PLACES     REFS          61
  2644  IUCOM      INTEGER                             REFS         341       368       815   DEFINED       336       338
    72  IUDESF     INTEGER                  PLACES     REFS          61
    44  IUDESI     INTEGER                  PLACES     REFS          61
    54  IUDESN     INTEGER                  PLACES     REFS          61
    34  IUDESO     INTEGER                  PLACES     REFS          61
    20  IUDLT      INTEGER                  PLAYFF     REFS          78
     2  IUDLTI     INTEGER                  PLAYFF     REFS          78
    76  IUDUM1     INTEGER                  PLACES     REFS          61
   100  IUDUM2     INTEGER                  PLACES     REFS          61
   102  IUDUM3     INTEGER                  PLACES     REFS          61
     4  IUGO1      INTEGER                  PLACES     REFS          61
     5  IUGO2      INTEGER                  PLACES     REFS          61
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VARIABLES       SN  TYPE              RELOCATION
     6  IUGO3       INTEGER              PLACES     REFS       61
     7  IUGO4       INTEGER              PLACES     REFS       61
   140  IUINCK      INTEGER              PLACES     REFS       61
   136  IUINCM      INTEGER              PLACES     REFS       61
     0  IUIN1       INTEGER              PLACES     REFS       61
     1  IUIN2       INTEGER              PLACES     REFS       61
    30  IUKS        INTEGER              PLACES     REFS       61
   104  IUL         INTEGER              PLACES     REFS       61
   114  IULR        INTEGER              PLACES     REFS       61
    56  IUMD        INTEGER              PLACES     REFS       61
    64  IUMDB       INTEGER              PLACES     REFS       61
    36  IUMDBI      INTEGER              PLACES     REFS       61
     0  IUMDFF      INTEGER              PLAYFF     REFS       78
    60  IUMEMF      INTEGER              PLACES     REFS       61
    24  IUMEMN      INTEGER              PLACES     REFS       61
    50  IUMEMO      INTEGER              PLACES     REFS       61
   124  IUMODK      INTEGER              PLACES     REFS       61
   122  IUMODM      INTEGER              PLACES     REFS       61
    14  IUMPL       INTEGER              PLAYFF     REFS       78
     6  IUMPLI      INTEGER              PLAYFF     REFS       78
     2  IUOUT1      INTEGER              PLACES     REFS       61
     3  IUOUT2      INTEGER              PLACES     REFS       61
    12  IUPATF      INTEGER              PLAYFF     REFS       78       338
   134  IUPH        INTEGER              PLACES     REFS       61
    26  IUPHA       INTEGER              PLAYFF     REFS       78
    30  IUPHAT      INTEGER              PLAYFF     REFS       78
   126  IUPHT       INTEGER              PLACES     REFS       61
   120  IUPHTF      INTEGER              PLACES     REFS       61       336
    17  IUPR        INTEGER              PLACES     REFS       61
   132  IUQ         INTEGER              PLACES     REFS       61
    22  IUQA        INTEGER              PLAYFF     REFS       78
    24  IUQAT       INTEGER              PLAYFF     REFS       78
   130  IUQT        INTEGER              PLACES     REFS       61
    10  IUSCR       INTEGER              PLACES     REFS       61
    16  IUSLT       INTEGER              PLAYFF     REFS       78
     4  IUSLTI      INTEGER              PLAYFF     REFS       78
    26  IUSTFN      INTEGER              PLACES     REFS       61
    62  IUSTFO      INTEGER              PLACES     REFS       61
    10  IUTPGT      INTEGER              PLAYFF     REFS       78
    74  IUWT        INTEGER              PLACES     REFS       61
    46  IUWTI       INTEGER              PLACES     REFS       61
    22  IUY         INTEGER              PLACES     REFS       61
   106  IUYT        INTEGER              PLACES     REFS       61
   110  IUZ         INTEGER              PLACES     REFS       61
   112  IUZR        INTEGER              PLACES     REFS       61
  2610  I23         INTEGER                         REFS      181       182   DEFINED     171
  2606  I33         INTEGER                         REFS      175       176       177     178       179       180
                                                 DEFINED      169
  2623  J           INTEGER                         REFS    2*262       283       289     764       770       771
                                                 DEFINED      261       283       289     763
  2656  JKNTR       INTEGER                         REFS      376       379       380     381   DEFINED       374       381
 15262  JPTS        INTEGER         ARRAY           REFS       34       313       317     321       322       427       503
                                                 DEFINED      307       423
  2671  JUMP        INTEGER                         REFS      467       475       518     520   DEFINED       462       517
  2633  K           INTEGER                         REFS      307       313       317     423     2*765     2*766       786
                                                      787     788       789   DEFINED     307       313       317       423
```

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VARIABLES     SN  TYPE          RELOCATION
     7  KBPAGE    INTEGER            CLIST      REFS       57
     0  KFREE     INTEGER            KLUFF      REFS       82      338      339
     4  KLABEL    INTEGER            CLIST      REFS       57
  2653  KNTR      INTEGER                       REFS      366      369      384      559      590
                                             DEFINED      364
     0  KOUNT     INTEGER            CLIST      REFS       57      140      148      278      280      285      287
                                                 290      309      311      314      347      353      355      397
                                                 399      402      434      438      821      826
                                             DEFINED      138      140      148      278      280      287      290
                                                 303      311      314      344      347      353      355      390
                                                 399      402      435      438      822      826
    11  KOUNTH    INTEGER            CLIST      REFS       57      285      309      397
    12  KOUNTI    INTEGER            CLIST      REFS       57
     1  KPAGE     INTEGER            CLIST      REFS       57
     0  KPLOTF    INTEGER            F.P.       REFS      820  DEFINED        1
     0  KPLOTS    INTEGER            CPLOTS     REFS       55      146  DEFINED      147
     0  KPLOTV    INTEGER   *UNUSED  F.P.    DEFINED        1
     0  KTABLE    INTEGER            CTABLE     REFS       59
     5  KTABLO    INTEGER            CTABLE     REFS       59
     5  KTPAGE    INTEGER            CLIST      REFS       57
  2657  L         INTEGER                       REFS    3*378    2*401  DEFINED      376      401
  2670  LEFT      INTEGER                       REFS      435      822  DEFINED      434      821
     2  LINES     INTEGER            CLIST      REFS       57      138      303      344      390      434      435
                                                 821      822
    10  LINESG    INTEGER            CLIST      REFS       57
     3  LINEST    INTEGER            CLIST      REFS       57
  2710  LM        INTEGER                       REFS      671      794
  2676  M         INTEGER                       REFS      547      555      668      669  DEFINED      546      554
                                                 667
  2611  MAX1      INTEGER                       REFS      185      189      190  DEFINED      172
  2612  MAX2      INTEGER                       REFS      187      191      192  DEFINED      173
  2613  MAX3      INTEGER                       REFS      186      188  DEFINED      174
  2652  MODE      INTEGER                       REFS      365      367      372      398  DEFINED      363      366
  2727  MPLOT     INTEGER   ARRAY               REFS       35     2*86       87       88      354      366      384
                                             DEFINED      351
  2572  MTAP1     INTEGER                    DEFINED      102  I/O REFS      125      547      587      668      688
                                                 690      752      809
  2573  MTAP2     INTEGER                    DEFINED      103  I/O REFS      126      555      588      669      689
                                                 691      753      810
  2574  MTAP3     INTEGER                    DEFINED      104  I/O REFS      127      316      317      420      422
                                                 423
  2575  MTAP4     INTEGER                    DEFINED      105  I/O REFS      128
 26562  NAME      INTEGER   ARRAY               REFS       51      341
  2627  NBEAMS    INTEGER                       REFS      305      421      594      595      601      602      645
                                             DEFINED      302
  2624  NC        INTEGER                       REFS      282  DEFINED      274
 16217  NCDEF     INTEGER   ARRAY               REFS       36      519      540      739  DEFINED      518      535
  2651  NCDI      INTEGER                       REFS      359      380      385    2*395      403
                                             DEFINED      358
  2647  NCOL      INTEGER                       REFS      341      368      378
     3  NCOLS     INTEGER            CTABLE     REFS       59
     4  NCOLST    INTEGER            CTABLE     REFS       59
 15306  NCOORD    INTEGER   ARRAY               REFS       36      474      493      540      565      566      577
                                                 578      646  DEFINED      467      492
  2713  NCYCL     INTEGER                       REFS      704      711  DEFINED      702
  2634  NENDP1    INTEGER                       REFS      323      324      325  DEFINED      321
```

```
                 16      COORD(J,NP)=CPOINT(J,N)                                                FERGCV     59
                       RETURN                                                                   FERGCV     60
   60                  END                                                                      FERGCV     61


      SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS      DEF LINE      REFERENCES
    3  FERGCV          1           59

VARIABLES     SN  TYPE            RELOCATION
    0  COORD      REAL        ARRAY     F.P.       REFS         8   DEFINED        1        54        56        58
    0  CPOINT     REAL        ARRAY     F.P.       REFS         8      2*35       54        56        58
                                                DEFINED         1
  253  F1         REAL        ARRAY                REFS         9        56   DEFINED       18
  302  GO         REAL        ARRAY                REFS        10      2*56   DEFINED       14
  245  I          INTEGER                          REFS      3*35      4*36      7*39      3*42      3*45      3*47      2*49
                                                     53        54      5*56   DEFINED       33        38        41        44
                                                     46        52
  246  J          INTEGER                          REFS      3*35      3*39      2*49      2*54      5*56      2*58
                                                DEFINED        34        37        48        51
  250  JJ         INTEGER                          REFS      2*55        56   DEFINED       50
    0  JUMP       INTEGER               F.P.       REFS        25        26   DEFINED        1
  252  K          INTEGER                          REFS      4*56   DEFINED        55
  242  L          INTEGER                          REFS        26        29        50        53   DEFINED        25        26
  251  M          INTEGER                          REFS        54        56   DEFINED       53
    0  N          INTEGER               F.P        REFS        28        45        46        58   DEFINED         1
    0  NCOORD     INTEGER    *UNUSED    F.P.    DEFINED         1
  243  NM         INTEGER                          REFS        29        33        38      7*43      2*45        52
                                                DEFINED        28
  244  NP         INTEGER                          REFS        58   DEFINED        29
  240  PCT        REAL                             REFS        47   DEFINED        22
  331  S          REAL        ARRAY                REFS        11      4*39        40        43        56
                                                DEFINED        36
  354  T          REAL        ARRAY                REFS        12      3*40        42      3*43        45      3*47        49
                                                   2*56   DEFINED        39        42        45        49
  247  TEMP       REAL                             REFS        42        45        49   DEFINED        40        43        47
  450  V          REAL        ARRAY                REFS        13      3*36      2*39      3*40        42      3*43        45
                                                     56   DEFINED        35

EXTERNALS          TYPE    ARGS       REFERENCES
       SQRT        REAL     1 LIBRARY     36        47

STATEMENT LABELS             DEF LINE   REFERENCES
    0  10                       36         33
    0  11                       35         34
    0  12                       39         37        38
    0  13                       42         41
    0  14                       45         44
    0  15                       49         46        48
    0  16                       58         51
    0  17                       56         52        55
```

```
      SUBROUTINE FERGCV(JUMP,CPOINT,N,COORD,NCOORD)                   FERGCV   2
C     24/JUMP IS THE NUMBER OF INTERVALS IN INTERPOLATION.            FERGCV   3
C     CPOINT(3,20) CONTAINS THE COORDINATES TO BG FIT                 FERGCV   4
C     N IS NUMBER OF POINTS TO BE USED FROM CPOINT                    FERGCV   5
C     COORD(3,NCOORD) CONTAINS COORDINATES OF CURVE FIT               FERGCV   6
C     NCOORD SHOULD BE (N-1)*24/JUMP+1                                FERGCV   7
C                                                                     FERGCV   8
      DIMENSION COORD(3,1)        ,CPOINT(3,1)                        FERGCV   9
      DIMENSION F1(23)                                                FERGCV  10
      DIMENSION GO(23)                                                FERGCV  11
      DIMENSION S(19)                                                 FERGCV  12
      DIMENSION T(3,20)                                               FERGCV  13
      DIMENSION V(3,19)                                               FERGCV  14
      DATA GO     /.03827,.07002,.09570,.11574,.13057,.14063,         FERGCV  15
     1             .14634,.14815,.14648,.14178,.13448,.12500,         FERGCV  16
     2             .11379,.10127,.08789,.07407,.06026,.04688,         FERGCV  17
     3             .03436,.02315,.01367,.00637,.00166/                FERGCV  18
      DATA F1     /.00506,.01968,.04297,.07407,.11212,.15625,         FERGCV  19
     1             .20558,.25926,.31641,.37616,.43764,.50000,         FERGCV  20
     2             .56236,.62384,.68359,.74074,.79442,.84375,         FERGCV  21
     3             .88788,.92593,.95703,.98032,.99494/                FERGCV  22
      DATA PCT    /0.90/                                              FERGCV  23
C     20=MAXIMUM NUMBER OF POINTS ON A BEAM                           FERGCV  24
C     19=MAXIMUM-1                                                    FERGCV  25
      L=24/JUMP                                                       FERGCV  26
      IF (L*JUMP.NE.24)L=4                                            FERGCV  27
C     JUMP SHOULD BE DIVISOR OF 24                                    FERGCV  28
      NM=N-1                                                          FERGCV  29
      NP=NM*L+1                                                       FERGCV  30
C                                                                     FERGCV  31
C     GET THE DISTANCE BETWEEN CONSECUTIVE NODE PTS.                  FERGCV  32
C                                                                     FERGCV  33
      DO 10 I=1,NM                                                    FERGCV  34
      DO 11 J=1,3                                                     FERGCV  35
   11    V(J,I)=CPOINT(J,I+1)-CPOINT(J,I)                             FERGCV  36
   10    S(I)=SQRT(V(1,I)**2+V(2,I)**2+V(3,I)**2)                     FERGCV  37
      DO 12 J=1,3                                                     FERGCV  38
      DO 12 I=2,NM                                                    FERGCV  39
   12    T(J,I)=(S(I)*V(J,I-1)+S(I-1)*V(J,I))/(S(I)+S(I-1))           FERGCV  40
      TEMP=(V(1,1)*T(1,2)+V(2,1)*T(2,2)+V(3,1)*T(3,2))/(S(1)**2)      FERGCV  41
      DO 13 I=1,3                                                     FERGCV  42
   13    T(I,1)=2.*V(I,1)*TEMP-T(I,2)                                 FERGCV  43
      TEMP=(V(1,NM)*T(1,NM)+V(2,NM)*T(2,NM)+V(3,NM)*T(3,NM))/S(NM)**2 FERGCV  44
      DO 14 I=1,3                                                     FERGCV  45
   14    T(I,N)=2.*V(I,NM)*TEMP-T(I,NM)                               FERGCV  46
      DO 15 I=1,N                                                     FERGCV  47
         TEMP=PCT/SQRT(T(1,I)**2+T(2,I)**2+T(3,I)**2)                 FERGCV  48
      DO 15 J=1,3                                                     FERGCV  49
   15    T(J,I)=T(J,I)*TEMP                                           FERGCV  50
      JJ=24/L                                                         FERGCV  51
      DO 16 J=1,3                                                     FERGCV  52
      DO 17 I=1,NM                                                    FERGCV  53
         M=(I-1)*L+1                                                  FERGCV  54
         COORD(J,M)=CPOINT(J,I)                                       FERGCV  55
      DO 17 K=JJ,23,JJ                                                FERGCV  56
   17    COORD(J,M+K/JJ)=S(I)*(T(J,I)*GO(K)-T(J,I+1)*GO(24-K))        FERGCV  57
     1          +CPOINT(J,I)+V(J,I)*F1(K)                             FERGCV  58
```

```
    1                SUBROUTINE  CLCORD (PROD, VEC, ANS)                              CLCORD      2
               C     SUBROUTINE TO TRANSFORM COORDINATES TO CALCOMP COORDINATES;      CLCORD      3
                     DIMENSION      PROD(2,1) ,     VEC(3,1) ,      ANS(1)            CLCORD      4
                     CALL MCMULT  (PROD, VEC, ANS, 2, 3, 2)                           CLCORD      5
    5                RETURN                                                           CLCORD      6
                     END                                                              CLCORD      7


      SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS      DEF LINE      REFERENCES
    3  CLCORD         1           5

VARIABLES      SN  TYPE            RELOCATION
    O  ANS         REAL       ARRAY     F.P.       REFS        3       4   DEFINED       1
    O  PROD        REAL       ARRAY     F.P.       REFS        3       4   DEFINED       1
    O  VEC         REAL       ARRAY     F.P.       REFS        3       4   DEFINED       1

EXTERNALS          TYPE   ARGS        REFERENCES
       MCMULT               6              4

STATISTICS
  PROGRAM LENGTH                   25B      21
         52000B CM USED
```

```
SUBROUTINE MAX        74/74   OPT=1                         FTN 4.8+577       85/01/23. 08.10.44       PAGE     1

                 SUBROUTINE MAX (VEC, MID, ANS)                                   MAX         2
                 DIMENSION         VEC(1)                                         MAX         3
                 ANS  =  VEC(1)                                                   MAX         4
                 DO 1  I=2,MID                                                    MAX         5
                 IF (VEC(I).GT.ANS)  ANS  =  VEC(I)                               MAX         6
               1 CONTINUE                                                         MAX         7
                 RETURN                                                           MAX         8
                 END                                                              MAX         9


     SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS      DEF LINE      REFERENCES
    3  MAX              1            7

VARIABLES      SN  TYPE             RELOCATION
    O  ANS         REAL                   F.P.       REFS        5   DEFINED        1        3        5
   22  I           INTEGER                           REFS      2*5   DEFINED        4
    O  MID         INTEGER                F.P.       REFS        4   DEFINED        1
    O  VEC         REAL         ARRAY     F.P.       REFS        2         3      2*5   DEFINED        1

STATEMENT LABELS                  DEF LINE   REFERENCES
    C  1                               6          4

LOOPS  LABEL     INDEX      FROM-TO      LENGTH     PROPERTIES
   14  1         I            4 6            4B       INSTACK

STATISTICS
  PROGRAM LENGTH                   25B        21
          52000B CM USED
```

```
SUBROUTINE ARAYMN     74/74   OPT=1                            FTN 4 8+577        85/01/23  08.10.44        PAGE      1

                  SUBROUTINE ARAYMN (VEC, MID, ANS)                                            ARAYMN      2
            C     SUBROUTINE TO GET THE MINIMUM VALUE OF AN ARRAY                              ARAYMN      3
                  DIMENSION      VEC(1)                                                        ARAYMN      4
                  ANS  =  VEC(1)                                                               ARAYMN      5
                  DO 1  I=2,MID                                                                ARAYMN      6
                  IF (VEC(I).LT.ANS)  ANS  = VEC(I)                                            ARAYMN      7
                1 CONTINUE                                                                     ARAYMN      8
                  RETURN                                                                       ARAYMN      9
                  END                                                                          ARAYMN     10


        SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS      DEF LINE      REFERENCES
    3  ARAYMN          1           8

VARIABLES      SN  TYPE            RELOCATION
    O  ANS         REAL                 F.P.        REFS        6   DEFINED        1          4          6
   22  I           INTEGER                          REFS      2*6   DEFINED        5
    O  MID         INTEGER              F.P.        REFS        5   DEFINED        1
    O  VEC         REAL        ARRAY    F.P.        REFS        3         4      2*6   DEFINED          1

STATEMENT LABELS               DEF LINE   REFERENCES
    O  1                           7          5

LOOPS  LABEL     INDEX      FROM-TO     LENGTH     PROPERTIES
   14  1         I             5 7          4B      INSTACK

STATISTICS
  PROGRAM LENGTH                   25B       21
        52000B CM USED
```

```
             SUBROUTINE ARAYMX (VEC,MID,ANS)                                      ARAYMX      2
      C      SUBROUTINE WHICH COMPUTES THE LARGEST ABSOLUTE VALUE OF AN ARRAY     ARAYMX      3
             DIMENSION        VEC(1)                                              ARAYMX      4
             KEY = 0                                                              ARAYMX      5
             DO 1  I=1,MID                                                        ARAYMX      6
             IF (VEC(I).EQ.0.) GOTO 1                                             ARAYMX      7
             IF (KEY.NE.0) GO TO 2                                                ARAYMX      8
             ANS  =  ABS(VEC(I))                                                  ARAYMX      9
             KEY = 1                                                              ARAYMX     10
             GO TO 1                                                              ARAYMX     11
           2 IF (ABS(VEC(I)).GT.ANS)   ANS = ABS(VEC(I))                          ARAYMX     12
           1 CONTINUE                                                             ARAYMX     13
             RETURN                                                               ARAYMX     14
             END                                                                  ~RAYMX     15
```

```
       SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS      DEF LINE     REFERENCES
    3  ARAYMX         1          13

VARIABLES      SN  TYPE            RELOCATION
    0  ANS         REAL                 F.P.        REFS        11    DEFINED      1        8        11
   26  I           INTEGER                          REFS         6          8    2*11   DEFINED       5
   25  KEY         INTEGER                          REFS         7    DEFINED      4        9
    0  MID         INTEGER              F.P.        REFS         5    DEFINED      1
    0  VEC         REAL        ARRAY    F.P.        REFS         3          6      8      2*11   DEFINED       1

INLINE FUNCTIONS   TYPE   ARGS        DEF LINE  REFERENCES
       ABS         REAL     1  INTRIN              8       2*11

STATEMENT LABELS               DEF LINE   REFERENCES
   23  1                          12         5         6        10
   20  2                          11         7

LOOPS  LABEL     INDEX      FROM-TO    LENGTH    PROPERTIES
   14  1         I            5 12       10B        OPT

STATISTICS
  PROGRAM LENGTH                 32B      26
         52000B CM USED
```

```
      SUBROUTINE MCMULT      74/74    OPT=1                          FTN 4.8+577        85/01/23. 08.10.44        PAGE      1

      1              SUBROUTINE  MCMULT (A,B,C,NRA,NCA,IDA)                                          MCMULT       2
                     DIMENSION   A(IDA,1),B(1),C(1)                                                  MCMULT       3
                     DO 100  I=1,NRA                                                                 MCMULT       4
                     C(I)  =  O.                                                                     MCMULT       5
      5              DO 100  J=1,NCA                                                                 MCMULT       6
                 100 C(I)  =  C(I) +  A(I,J) * B(J)                                                  MCMULT       7
                     RETURN                                                                          MCMULT       8
                     END                                                                             MCMULT       9


      SYMBOLIC REFERENCE MAP (R=3)

  ENTRY POINTS     DEF LINE     REFERENCES
      3  MCMULT        1            7

  VARIABLES     SN  TYPE            RELOCATION
      O  A          REAL        ARRAY     F.P.        REFS         2         6   DEFINED        1
      O  B          REAL        ARRAY     F.P.        REFS         2         6   DEFINED        1
      O  C          REAL        ARRAY     F.P.        REFS         2         6   DEFINED        1         4         6
     31  I          INTEGER                           REFS         4       3*6   DEFINED        3
      O  IDA        INTEGER               F.P.        REFS         2   DEFINED        1
     32  J          INTEGER                           REFS       2*6   DEFINED        5
      O  NCA        INTEGER               F.P.        REFS         5   DEFINED        1
      O  NRA        INTEGER               F.P.        REFS         3   DEFINED        1

  STATEMENT LABELS              DEF LINE    REFERENCES
      O  100                        6           3         5

  LOOPS  LABEL    INDEX      FROM-TO     LENGTH     PROPERTIES
     11  100      I            3 6         17B                NOT INNER
     21  100      J            5 6          3B        INSTACK

  STATISTICS
    PROGRAM LENGTH                  42B       34
            52000B CM USED
```

```
 1              SUBROUTINE MMULT (A,B,C,NRA,NCA,NCB,IDA,IDB,IDC)                MMULT     2
                DIMENSION      A(IDA,1) ,     B(IDB,1) ,     C(IDC,1)           MMULT     3
                DO 100  I=1,NRA                                                 MMULT     4
                DO 100  J=1,NCB                                                 MMULT     5
 5              C(I,J)  =  O.                                                   MMULT     6
                DO 100  K=1,NCA                                                 MMULT     7
            100 C(I J) = C(I,J) + A(I,K)*B(K,J)                                 MMULT     8
                RETURN                                                          MMULT     9
                END                                                             MMULT    10



     SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS     DEF LINE     REFERENCES
   3  MMULT          1            8

VARIABLES     SN  TYPE            RELOCATION
   O  A           REAL       ARRAY     F.P.        REFS        2         7   DEFINED         1
   O  B           REAL       ARRAY     F.P.        REFS        2         7   DEFINED         1
   O  C           REAL       ARRAY     F.P.        REFS        2         7   DEFINED         1          5          7
  50  I           INTEGER                          REFS        5       3*7   DEFINED         3
   O  IDA         INTEGER              F.P.        REFS        2   DEFINED         1
   O  IDB         INTEGER              F.P.        REFS        2   DEFINED         1
   O  IDC         INTEGER              F.P.        REFS        2   DEFINED         1
  51  J           INTEGER                          REFS        5       3*7   DEFINED         4
  52  K           INTEGER                          REFS      2*7   DEFINED         6
   O  NCA         INTEGER              F.P.        REFS        6   DEFINED         1
   O  NCB         INTEGER              F.P.        REFS        4   DEFINED         1
   O  NRA         INTEGER              F.P.        REFS        3   DEFINED         1

STATEMENT LABELS              DEF LINE   REFERENCES
   O  100                         7          3          4          6

LOOPS  LABEL     INDEX      FROM-TO     LENGTH     PROPERTIES
   14  100       I            3 7         30B                NOT INNER
   15  100       J            4 7         25B                NOT INNER
   33  100       K            6 7          3B       INSTACK

STATISTICS
  PROGRAM LENGTH                  63B       51
        52000B CM USED
```

```
EQUIV CLASSES   LENGTH     MEMBERS - BIAS NAME(LENGTH)
      U           1371                0 COORD  (1371)          457 V       (457)

STATISTICS
  PROGRAM LENGTH                  26577B   11647
  CM LABELED COMMON LENGTH          310B     200
          52000B CM USED
```

```
COMMON BLOCKS    LENGTH      MEMBERS - BIAS NAME(LENGTH)
      CPLOTS          1               0 KPLOTS (1)
      CONSTS          2               0 NO     (1)          1 YES    (1)
      CLIST          11               0 KOUNT  (1)          1 KPAGE  (1)          2 LINES  (1)
                                      3 LINEST (1)          4 KLABEL (1)          5 KTPAGE (1)
                                      6 NPAGE  (1)          7 KBPAGE (1)          8 LINESG (1)
                                      9 KOUNTH (1)         10 KOUNTI (1)
      CTABLE          8               0 KTABLE (1)          1 NPASS  (1)          2 NROWS  (1)
                                      3 NCOLS  (1)          4 NCOLST (1)          5 KTABLO (1)
                                      6 NPAGEA (1)          7 ITAPET (1)
      PLACES         98               0 IUIN1  (1)          1 IUIN2  (1)          2 IUOUT1 (1)
                                      3 IUOUT2 (1)          4 IUGO1  (1)          5 IUGO2  (1)
                                      6 IUGO3  (1)          7 IUGO4  (1)          8 IUSCR  (1)
                                      9 IFSCR  (1)         10 IFS1   (1)         11 IFS2   (1)
                                     12 IFS3   (1)         13 IFS4   (1)         14 IUCD   (1)
                                     15 IUPR   (1)         16 IUA    (1)         17 IFA    (1)
                                     18 IUY    (1)         19 IFY    (1)         20 IUMEMN (1)
                                     21 IFMEMN (1)         22 IUSTFN (1)         23 IFSTFN (1)
                                     24 IUKS   (1)         25 IFKS   (1)         26 IUB    (1)
                                     27 IFB    (1)         28 IUDESO (1)         29 IFDESO (1)
                                     30 IUMDBI (1)         31 IFMDBI (1)         32 IUADDI (1)
                                     33 IFADDI (1)         34 IUBALI (1)         35 IFBALI (1)
                                     36 IUDESI (1)         37 IFDESI (1)         38 IUWTI  (1)
                                     39 IFWTI  (1)         40 IUMEMO (1)         41 IFMEMO (1)
                                     42 IUBT   (1)         43 IFBT   (1)         44 IUDESN (1)
                                     45 IFDESN (1)         46 IUMD   (1)         47 IFMD   (1)
                                     48 IUMEMF (1)         49 IFMEMF (1)         50 IUSTFO (1)
                                     51 IFSTFO (1)         52 IUMDB  (1)         53 IFMDB  (1)
                                     54 IUADD  (1)         55 IFADD  (1)         56 IUBAL  (1)
                                     57 IFBAL  (1)         58 IUDESF (1)         59 IFDESF (1)
                                     60 IUWT   (1)         61 IFWT   (1)         62 IUDUM1 (1)
                                     63 IFDUM1 (1)         64 IUDUM2 (1)         65 IFDUM2 (1)
                                     66 IUDUM3 (1)         67 IFDUM3 (1)         68 IUL    (1)
                                     69 IFL    (1)         70 IUYT   (1)         71 IFYT   (1)
                                     72 IUZ    (1)         73 IFZ    (1)         74 IUZR   (1)
                                     75 IFZR   (1)         76 IULR   (1)         77 IFLR   (1)
                                     78 IUBR   (1)         79 IFBR   (1)         80 IUPHTF (1)
                                     81 IFPHTF (1)         82 IUMODM (1)         83 IFMODM (1)
                                     84 IUMODK (1)         85 IFMODK (1)         86 IUPHT  (1)
                                     87 IFPHT  (1)         88 IUQT   (1)         89 IFQT   (1)
                                     90 IUQ    (1)         91 IFQ    (1)         92 IUPH   (1)
                                     93 IFPH   (1)         94 IUINCM (1)         95 IFINCM (1)
                                     96 IUINCK (1)         97 IFINCK (1)
      PLAYFF         26               0 IUMDFF (1)          1 IFMDFF (1)          2 IUDLTI (1)
                                      3 IFDLTI (1)          4 IUSLTI (1)          5 IFSLTI (1)
                                      6 IUMPLI (1)          7 IFMPLI (1)          8 IUTPGT (1)
                                      9 IFTPGT (1)         10 IUPATF (1)         11 IFPATF (1)
                                     12 IUMPL  (1)         13 IFMPL  (1)         14 IUSLT  (1)
                                     15 IFSLT  (1)         16 IUDLT  (1)         17 IFDLT  (1)
                                     18 IUQA   (1)         19 IFQA   (1)         20 IUQAT  (1)
                                     21 IFQAT  (1)         22 IUPHA  (1)         23 IFPHA  (1)
                                     24 IUPHAT (1)         25 IFPHAT (1)
      KLUFF           1               0 KFREE  (1)

EQUIV CLASSES    LENGTH      MEMBERS - BIAS NAME(LENGTH)
      MPLOT          40               0 A      (9)          0 TITLE  (18)         9 B      (9)
                                     18 C      (9)
      UU            954               0 XX     (954)      457 VV     (457)
```

```
STATEMENT LABELS                DEF LINE   REFERENCES
  1323  72                         729        704
     0  73                         724        711
    75  77                         164        146
   537  90                         392        403
   554  92                         400        397
     7  100                         95         96
  2363  9000    FMT                834         95      142
  2365  9001    FMT                835        143
  2367  9002    FMT                836        222
  2371  9003    FMT                837        274      302      307      350      351      358      359
  2373  9004    FMT                838        279      286
  2405  9005    FMT                840        283
  2410  9006    FMT                841        289
  2414  9007    FMT                842        295
  2417  9008    FMT                843        306
  2421  9009    FMT                844        310
  2433  9010    FMT                846        313
  2436  9011    FMT                847        346
  2455  9012    FMT                851        354
  2465  9013    FMT                853        398
  2500  9014    FMT                856        401
  2503  9015    FMT                857        437
  2526  9016    FMT                862        150
  2534  9017    FMT                863        825
  1466  9500                       827        820

LOOPS   LABEL   INDEX    FROM-TO    LENGTH   PROPERTIES
   50   1       I        141 144       7B              EXT REFS
  231   10      I        260 262      15B              NOT INNER
  240   10      J        261 262       3B     INSTACK
  262   20      I        282 291      34B              EXT REFS
  325   30      I        305 329      65B              EXT REFS
  465   21      KNTR     364 813     757B              EXT REFS  NOT INNER
  472   48      I        367 368       5B              EXT REFS
  532   28      IM       385 387       2B     INSTACK
  560           L        401 401       7B              EXT REFS
  603   18      II       414 417       3B     INSTACK
  612   62      I        421 585     311B              EXT REFS  NOT INNER
  624   31      II       426 456      70B              EXT REFS
  726   32      II       477 483      11B              EXT REFS
  741   13      II       486 491      11B              EXT REFS
  757   41      II       501 512      25B              EXT REFS
 1016   38      II       521 526      13B              EXT REFS
 1033   16      II       529 534      13B              EXT REFS
 1055   53      M        546 549      10B              EXT REFS
 1066   56      M        554 557      10B              EXT REFS
 1163   60      I        645 801     253B              EXT REFS  NOT INNER
 1176   61      M        667 670      15B              EXT REFS
 1217   71      II       678 733     113B              EXT REFS  NOT INNER
 1262   73      IJ       711 724      36B              EXT REFS
 1335   63      II       751 754      15B              EXT REFS
 1354   64      K        762 798      57B              EXT REFS  NOT INNER
 1355   65      J        763 797      54B              EXT REFS

COMMON BLOCKS   LENGTH     MEMBERS - BIAS NAME(LENGTH)
       COMRWP        3               0 ITAPER (1)              1 ITAPEW (1)              2 ITAPEP (1)
       [illegible]          [illegible]
```

```
EXTERNALS           TYPE   ARGS        REFERENCES
       MMULT                 9             253       256       266
       NUMBER                6             373
       PLB                   3             149       277       352       824
       PLOT                  3             370       709       717       721       725       730       731       819
       PLOTS                 3             161
       PROGNA                2             136
       SIN          REAL     1 LIBRARY     234       235       240       242       247       248       715       719       768
       SQRT         REAL     1 LIBRARY     327       700
       TIMEB                 2             829
       TITLES                1             139       284       308       345       396       436       823

INLINE FUNCTIONS    TYPE   ARGS         DEF LINE  REFERENCES
       ABS          REAL     1  INTRIN             606       664       694       696       792
       IABS         INTEGER  1  INTRIN             366

STATEMENT LABELS              DEF LINE    REFERENCES
    0   1                        144         141
    0   10                       262         260       261
  740   11                       486         460
  754   12                       495         485
    0   13                       491         486
 1032   14                       529         516
 1050   15                       537         528
    0   16                       534         529
  367   17                       321         318
    0   18                       417         414
    0   20                       291         282
    0   21                       813         364
  503   22                       371         369
    0   23          INACTIVE     224
  303   25                       288         285
  535   27                       389         384
    0   28                       387         385
  344   29                       312         309
  407   30                       329         305       319
  711   31                       456         426       442       446       450
    0   32                       483         477
  662   33                       443         431
  672   34                       447         432
  702   35                       451         433
    0   38                       526         521
  510   39                       375         382
    0   41                       512         501
  524   44                       383         380
    0   48                       368         367
    0   53                       549         546
    0   56                       557         554
    0   60                       801         645
    0   61                       670         667
 1120   62                       585         421       559
    0   63                       754         751
    0   64                       798         762
    0   65                       797         763
 1402   66                       773         764
 1404   67                       785         772
 1162   68                       614         590
 1327   71                       733         679       726
```

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VARIABLES     SN  TYPE           RELOCATION
 5602  V          REAL      ARRAY                 REFS      40       84       192      671      694      696     2*700
                                                  2*706    709      713      725      730      731     2*765     787
                                                   789   DEFINED    664      665      669      689      691      694
                                                   696     753
 2660  VALU       REAL                            REFS     379   DEFINED     377      378
 2054  VAPL       REAL                            REFS      96   DEFINED      91
 2721  VLL        REAL                            REFS     715   DEFINED     713      723
 2571  VPVAR      REAL                            REFS      96   DEFINED      95
 2601  VSCALE     REAL                            REFS     606      610      611   DEFINED     123
 2723  VUL        REAL                            REFS     717      719      721      723   DEFINED     715      719
 3710  VV         REAL      ARRAY                 REFS      41       85
17225  V1         REAL      ARRAY                 REFS      42      794   DEFINED     787      789      792      793
17231  WKAREA     REAL      ARRAY                 REFS      43      186      475      487   DEFINED     428      429
                                                   430
 2630  WORD1      REAL                            REFS     313      316      318   DEFINED     306      422
 2631  WORD2      REAL                            REFS     313      316      318   DEFINED     306      422
17325  WORK       REAL      ARRAY                 REFS      44      368      378
 2636  XDIST      REAL                            REFS     326   DEFINED     323
 2655  XMODNO     REAL                            REFS     373   DEFINED     372
17670  XPRIM      REAL      ARRAY                 REFS      46      185      289    2*323    2*324    2*325      428
                                                   429     430      439      440      441      443      444      445
                                                   447     448      449      451      452      453      504
                                                DEFINED    283
 2051  XSYM       REAL                            REFS     431   DEFINED      90
 2777  XX         REAL      ARRAY                 REFS      47     2*85      547      565      566
                                                DEFINED    480      488      505      509      523      531
17635  XXX        REAL      ARRAY                 REFS      45      180      253      256
24430  XX2        REAL      ARRAY                 REFS      48      555      577      578   DEFINED     481      489
                                                   506     510      524      532
 2637  YDIST      REAL                            REFS     326   DEFINED     324
    1  YES        INTEGER             CONSTS      REFS       3       56      820
26442  YMAX       REAL      ARRAY                 REFS      50      566      594
26322  YMIN       REAL      ARRAY                 REFS      49      565      601
 2052  YSYM       REAL                            REFS     432   DEFINED      90
 2640  ZDIST      REAL                            REFS     326   DEFINED     325
 2607  ZERO       REAL                            REFS     175      176      177      178      179      180      181
                                                   182     183      184      185      186      187      188      189
                                                   190     191      192   DEFINED     170
26512  ZMAX       REAL      ARRAY                 REFS      50      578      595
26372  ZMIN       REAL      ARRAY                 REFS      49      577      602
 2053  ZSYM       REAL                            REFS     433   DEFINED      90
       VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS           TYPE   ARGS        REFERENCES
       ARAYMN               3             565      577      601      602
       ARAYMX               3             408
       ATAN2        REAL    2 LIBRARY     708      767
       CLCORD               3             479      487      504      508      522      530
       COS          REAL    1 LIBRARY     233      236      239      243      246      249      714      718      769
       DCLOSE               1             815
       DVALUE               3             175      176      177      178      179      180      181      182      183
                                          184      185      186      187      188      189      190      191      192
       FERGCV               5             475      520
       GEDLAB               6             341
       GETROW               4             368
       LINE                 6             671      794
       MAX                  3             566      578      594      595
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VARIABLES      SN  TYPE             RELOCATION
  2654  NEXT        INTEGER                          REFS       367   DEFINED     365
  2662  NF          INTEGER                          REFS       393       394     395       401       403
                                                  DEFINED       391       394     395
  2646  NMODES   *  INTEGER                          REFS       341
     0  NO          INTEGER              CONSTS      REFS        56       146     147
     6  NPAGE       INTEGER              CLIST       REFS        57
     6  NPAGEA      INTEGER              CTABLE      REFS        59
     1  NPASS       INTEGER              CTABLE      REFS        59
  2650  NPLOTS      INTEGER                          REFS       351     2*354     364   DEFINED       350
     0  NPLOTV      INTEGER   *UNUSED    F.P.     DEFINED         1
  2632  NPTBM       INTEGER                          REFS       307       313     316       317       322       423       424
                                                      426       460       467     475       500       501       516       518
                                                      520       523       524     531       532   DEFINED       306       422
  2711  NPTBMI      INTEGER                          REFS       678   DEFINED     677
  2707  NPTS        INTEGER                          REFS       662       663     664       665       667       671       751
                                                      761   DEFINED       646     739
 17130  NPTSBM      INTEGER   ARRAY                  REFS        36       540     677   DEFINED       424
  2724  NPTSM1      INTEGER                          REFS       762   DEFINED     761
     2  NROWS       INTEGER              CTABLE      REFS        59
  2663  NS          INTEGER                          REFS       401   DEFINED     393
  2667  NSUM        INTEGER                          REFS       546       554 DEFINED       419       540
  2625  NUM         INTEGER                          REFS     2*283     3*289     428       429       430       431       432
                                                      433       437       439     440       441     2*443       444       445
                                                    2*447       448       449   2*451       452       453       504
                                                  DEFINED       283       427     503
  2672  N1          INTEGER                          REFS       475       477     505       506       509       510       523
                                                      524       531       532 DEFINED       474       493
  2675  N2          INTEGER                          REFS       520       521 DEFINED       519
 17646  PI          REAL      ARRAY                  REFS        45       178     256       262
 17657  PITR        REAL      ARRAY                  REFS        45       179     266   DEFINED       262
 17206  PROD        REAL      ARRAY                  REFS        37       181     266       479       487       504       508
                                                      522       530       606     664       694       696       792
  2626  RATIO       REAL                             REFS       328       346 DEFINED       295
 17200  RORMV       REAL      ARRAY                  REFS        37       182     266   DEFINED       195       196
  2665  RRAT        REAL                             REFS       415   DEFINED     412
 17214  SCRTCH      REAL      ARRAY                  REFS        38       183
 17217  SCRT2       REAL      ARRAY                  REFS        38       184     479       480       481       487       488
                                                      489       504       505     506       508       509       510       522
                                                      523       524       530     531       532
  2706  SHIFT       REAL                             REFS       664       694     696       792   DEFINED       610       611
  2701  SMLSTY      REAL                             REFS       601       605     662       692       693       790
  2702  SMLSTZ      REAL                             REFS       602       606     664       694       696       792
  2614  THET1D      REAL                             REFS       225   DEFINED     222
  2620  THET1R      REAL                             REFS       233       234     235       236   DEFINED       225
  2615  THET2D      REAL                             REFS       226   DEFINED     222
  2621  THET2R      REAL                             REFS       239       240     242       243   DEFINED       226
  2616  THET3D      REAL                             REFS       227   DEFINED     222
  2622  THET3R      REAL                             REFS       246       247     248       249   DEFINED       227
  2727  TITLE       REAL      ARRAY                  REFS        39        88     143   DEFINED       142
  4671  U           REAL      ARRAY                  REFS        40        84     191       671       692       693     2*700
                                                    2*707       709       712     725       730       731     2*766       786
                                                      788   DEFINED       662     663       668       688       690       692
                                                      693       752
  2720  ULL         REAL                             REFS       714   DEFINED     712       722
  2777  UU          REAL      ARRAY                  REFS        41        85
  2722  UUL         REAL                             REFS       717       718     721       722   DEFINED       714       718
 17221  U1          REAL      ARRAY                  REFS        42       794 DEFINED       786       788       790       791
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LOOPS  LABEL   INDEX   FROM-TO   LENGTH   PROPERTIES
   20  10      I       33 36       24B             EXT REFS  NOT INNER
   27  11      J       34 35        3B    INSTACK
   45  12      J       37 39       16B             NOT INNER
   53  12      I       38 39        5B    INSTACK
   74  13      I       41 42        4B    INSTACK
  120  14      I       44 45        4B    INSTACK
  126  15      I       46 49       22B             EXT REFS  NOT INNER
  142  15      J       48 49        3B    INSTACK
  155  16      J       51 58       55B             NOT INNER
  156  17      I       52 56       45B             NOT INNER
  203  17      K       55 56       14B       OPT

STATISTICS
  PROGRAM LENGTH              554B     364
        52000B CM USED
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      C                                                                         AFAM     2
      C45700, SUB. AFAM (AUTOMATED FLUTTER ANALYSIS MODULE)                     AFAM     3
      C                                                                         AFAM     4
      C                                                                       * AFAM     5
      C************************************************************************ AFAM     6
      C************************************************************************ AFAM     7
      C************************************************************************ AFAM     8
      C************************************************************************ AFAM     9
      C************************************************************************ AFAM    10
      C*****                                                             ****** AFAM    11
      C*****                    AAA    FFFFF    AAA    M   M             ****** AFAM    12
      C*****                   A   A   F       A   A   MM MM             ****** AFAM    13
      C*****                   AAAAA - FFFF  - AAAAA   M M M             ****** AFAM    14
      C*****                   A   A   F       A   A   M M M             ****** AFAM    15
      C*****                   A   A   F       A   A   M M M             ****** AFAM    16
      C*****                                                             ****** AFAM    17
      C************************************************************************ AFAM    18
      C************************************************************************ AFAM    19
      C************************************************************************ AFAM    20
      C************************************************************************ AFAM    21
      C************************************************************************ AFAM    22
      C                                                                       * AFAM    23
      C************************************************************************ AFAM    24
      C                                                                       * AFAM    25
      C***   SUBROUTINE AFAM  ************************************************** AFAM    26
      C                                                                       * AFAM    27
      C***   COMPUTER VERSION                                                  * AFAM    28
      C      ----------------                                                  * AFAM    29
      C      IBM .... AS IS.                                                   * AFAM    30
      C                                                                       * AFAM    31
      C      CDC .... AS IS.                                                   * AFAM    32
      C                                                                       * AFAM    33
      C***   OBJECTIVE  *********************************************************** AFAM    34
      C      ---------                                                         * AFAM    35
      C      MAJOR PROGRAM, WHICH CALLS OTHER PROGRAMS, FOR PERFORMING          * AFAM    36
      C      FLUTTER ANALYSIS.                                                 * AFAM    37
      C                                                                       * AFAM    38
      C***   INPUT/OUTPUT  ******************************************************** AFAM    39
      C      ------------                                                      * AFAM    40
      C                                                                       * AFAM    41
      C***   SUMMARY OF SYMBOLS  ****************************  **************** AFAM    42
      C      ------------------                                                * AFAM    43
      C....  KLUEF(I) ..... INPUT, (I = 1,...,LKLUEF)                          * AFAM    44
      C      INPUT DATA CONTROL WORD OPTIONS TO OBTAIN VIBRATION INFORMATION   * AFAM    45
      C                                                                       * AFAM    46
      C      VALUES ENTERED AS DATA HAVE THE FOLLOWING GENERAL FUNCTION ...    * AFAM    47
      C      KLUEF( I) = O, DO NOT PERFORM THE I'TH OPTION OF FLUTTER          * AFAM    48
      C                     ANALYSIS.                                          * AFAM    49
      C                = I, PERFORM THE I'TH OPTION OF FLUTTER ANALYSIS.       * AFAM    50
      C                                                                       * AFAM    51
      C      WHERE THE SPECIFIC FUNCTION OF EACH VARIABLE IS.                  * AFAM    52
      C      KLUEF( 1) =-1                                                     * AFAM    53
      C                                                                       * AFAM    54
      C      THE VALUES OF THE CARD INPUT DATA CONTROL WORD OPTIONS (KLUEF(I))* AFAM    55
      C      GIVEN ABOVE ARE ENTERED INTO THE PROGRAM BY THE SUBROUTINE CLUES * AFAM    56
      C      AND THEN CHANGED, WITHIN THE SUBROUTINE CLUES, TO A NEW SET OF    * AFAM    57
      C      NUMERICAL VALUES.                                                 * AFAM    58
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C     A VALUE OF ONE (CORRESPONDING TO THE ORIGINAL ZERO VALUE)       * AFAM      59
C     INDICATES THAT THE OPTION IS TO BE DELETED WHEREAS A VALUE OF TWO* AFAM     60
C     (CORRESPONDING TO THE ORIGINAL I'TH VALUE) INDICATES THAT THE   * AFAM      61
C     OPTION IS TO BE EXERCISED.                                      * AFAM      62
C     FINALLY, FOR PROGRAMMING CONVENIENCE, A NEW SET OF OPTIONS      * AFAM      63
C     REFERRED TO AS PROGRAM CONTROL WORD OPTIONS (KXXXXX) ARE DEFINED * AFAM     64
C     TO BE EQUIVALENT TO THE CARD INPUT CONTROL WORD OPTIONS.        * AFAM      65
C                                                                     * AFAM      66
C     KLUEF(I) = O, IS CHANGED TO 1, AND CORRESPONDS TO  KXXXXX = 1   * AFAM      67
C     KLUEF(I) = I, IS CHANGED TO 2, AND CORRESPONDS TO  KXXXXX = 2   * AFAM      68
C                                                                     * AFAM      69
C     THE SPECIFIC RELATIONSHIP OF THE CARD INPUT DATA AND PROGRAM    * AFAM      70
C     CONTROL WORD OPTIONS IS GIVEN BELOW.                            * AFAM      71
C                                                                     * AFAM      72
C     KLUEF( 1) = KDUMMY                                              * AFAM      73
C                                                                     * AFAM      74
C.... KLUEF(I) ..... INTERMEDIATE, (I = LKLUEF+1,...,2*LKLUEF)        * AFAM      75
C     PROGRAM CONTROL WORD OPTION FOR INDICATING WHICH OF THE OPTIONS * AFAM      76
C     IN FLUTTER ANALYSIS HAVE BEEN PERFORMED.                        * AFAM      77
C                                                                     * AFAM      78
C     VALUES DEFINED WITHIN THE PROGRAM HAVE THE FOLLOWING GENERAL    * AFAM      79
C     FUNCTION ...                                                    * AFAM      80
C     KLUEF(I) = O, THE I'TH FLUTTER ANALYSIS OPTION HAS NOT          * AFAM      81
C                   BEEN PERFORMED IN THE CURRENT RUN.                * AFAM      82
C              = I, THE I'TH FLUTTER ANALYSIS OPTION HAS BEEN         * AFAM      83
C                   PERFORMED IN THE CURRENT RUN.                     * AFAM      84
C     WHERE THE SPECIFIC FUNCTION OF EACH VARIABLE IS ASSOCIATED WITH * AFAM      85
C     THE SPECIFIC FUNCTION OF THE VARIABLE KLUEF(I) FOR              * AFAM      86
C     I = 1,...,LKLUEF.                                               * AFAM      87
C     LC(1)    = -1  P/K FLUTTER                                        AFAM      88
C              =  O  PRESSURES ONLY                                     AFAM      89
C              =  1  K FLUTTER                                          AFAM      90
C              =  2  DIVERGENCE                                         AFAM      91
C     LC(2)    =  NO. OF MODES                                          AFAM      92
C     LC(3)    =  NO. OF SURFACES                                       AFAM      93
C     LC(4)    =  NO. OF REDUCED VELOCITIES (.GE.1)                     AFAM      94
C     LC(5)    =  NO. OF DENSITIES (.GE.1)                              AFAM      95
C     LC(6)    =  CLUE WORD FOR DISPLAY OF GEN. AIR FORCES AS COMPUTED  AFAM      96
C     LC(7)    =  CLUE WORD FOR LISTING PRESSURES                       AFAM      97
C     LC(8)    =  CLUE WORD FOR LIFT COEFFICIENTS                       AFAM      98
C     LC(9)    =  CLUE WORD FOR ADDITIONS TO FLUTTER DETERMINANT        AFAM      99
C     LC(10)   =  CLUE WORD FOR LISTING GEN. AIR FORCES IN QINTP        AFAM     100
C     LC(11)   =  REF. FREQ. INDEX  ********* K FLUTTER                 AFAM     101
C     LC(12)   =  O  A INVERSE ,  = 1  B INVERSE ****** K FLUTTER       AFAM     102
C     LC(13)   =  CLUE WORD FOR GEN. AIR FORCE INTERPOLATION            AFAM     103
C     LC(14)   =  CLUE WORD FOR CALCOMP (FLUTTER)                       AFAM     104
C     LC(15)   =  O  EQUIV. VELOCITY ,  = 1 TRUE VELOCITY  (FLUTTER)    AFAM     105
C     LC(16)   =  CLUE WORD FOR STRUCTURAL DAMPING INPUT (FLUTTER)      AFAM     106
C              =  1 SAME FOR ALL MODES , = -1 AS SPECIFIED              AFAM     107
C     LC(17)   =  CLUE WORD FOR DISPLAY OF NO. OF ITERATIONS (P/K)      AFAM     108
C     LC(18)   =  CLUE WORD FOR ROOT INTERPOLATION ***** P/K            AFAM     109
C     LC(19)   =  CLUE WORD FOR POST SOLUTION INTERPOLATION ***** P/K   AFAM     110
C     LC(20)   =  CLUE WORD FOR DISPLAY OF ITERATIONS IN FLUTTER        AFAM     111
C                 SOLUTION ROUTINES                                     AFAM     112
C     LC(21)   =  1  RODDEN VORTEX LATTICE PROGRAM                      AFAM     113
C              =  2  SUPERSONIC MACH BOX PROGRAM                        AFAM     114
C              =  3  SUBSONIC COLLOCATION PROGRAM                       AFAM     115
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C     LC(22)   =  CLUE WORD FOR AIC TAPE                               AFAM     116
C              =  0  COMPUTE          ,  -1 FOR MACH BOX AIC           AFAM     117
C              =  1  EXISTS ON TAPE                                    AFAM     118
C     LC(23)   =  CLUE WORD FOR DISPLAY OF MODAL INPUT DATA            AFAM     119
C     LC(24)   =  CLUE WORD FOR DISPLAY OF MODAL INTERPOLATION OUTPUT  AFAM     120
C     LC(25)   =  NO. OF MODE ELIMINATION CYCLES                       AFAM     121
C     LC(26)   =  NO. OF STIFFNESS VARIATION CYCLES                    AFAM     122
C     LC(27)   =  INDEX OF MODE FOR STIFFENSS VARIATION                AFAM     123
C     LC(28)   =  CLUE WORD FOR VECTORS                                AFAM     124
C     LC(29)   =  LIST PHYSICAL VECTORS FOR K ANALYSIS                 AFAM     125
C     LC(30)   =  CLUE WORD FOR LISTING FLUTTER DETERMINANT            AFAM     126
C     LC(31)   =  CLUE WORD FOR GEN. MASS ADDITIONS AND FREQ. CHANGE   AFAM     127
C     LC(32)   =  CLUE WORD FOR ADDITIONS TO SPRING TERMS              AFAM     128
C     LC(33)   =  CLUE WORD FOR STEADY STATE SOLUTION                  AFAM     129
C     LC(34)   =  CLUE WORD FOR CHANGES TO GEN. AIR FORCES             AFAM     130
C     LC(35)   =  CLUE WORD FOR DISPLAY OF DIAPHRAGM DOWNWASH VALUES   AFAM     131
C                 SUPERSONIC PROGRAM FOR LC(22) = 0 OR -1              AFAM     132
C     LC(36)   =  CLUE WORD FOR FLUTTER OPTIMIZATION DATA              AFAM     133
C     LC(37)   =  CLUE WORD FOR DISPLAY OF GEOMETRY DATA               AFAM     134
C                  IN DOUBLET LATTICE PROGRAM                          AFAM     135
C     LC(38)   =  CLUE WORD FOR AUTOMATIC EXCLUSION OF VIBRATION       AFAM     136
C                 MODES BASED ON RATIO OF GEN. AIR FORCES TO GEN.      AFAM     137
C                 MASSES                                               AFAM     138
C                                                                      AFAM     139
C                                                                    * AFAM     140
C***  ERROR MESSAGES  *********************************************** AFAM     141
C     --------------                                                 * AFAM     142
C     NONE.                                                            AFAM     143
C                                                                    * AFAM     144
C******************************************************************** AFAM     145
C                                                                      AFAM     146
      SUBROUTINE AFAM (KPLOTF)                                         AFAM     147
C                                                                      AFAM     148
      INTEGER YES                                                      AFAM     149
      COMPLEX B, DETAD                                                 AFAM     150
C                                                                      AFAM     151
      DIMENSION FMTA(1)                                                AFAM     152
      DIMENSION ITAPES(50),KLUEF(20),KLUE(80)                          AFAM     153
      DIMENSION TSH(1)            ,TSHF(1)                             AFAM     154
      DIMENSION         LC(40)                                         AFAM     155
      DIMENSION B(40,40),DETAD(40,40),WW(40,40),OMGR(40)               AFAM     156
      DIMENSION NOTI(25),NINZ(40,25)                                   AFAM     157
      DIMENSION QMWT(40,5),QWT(5)                                      AFAM     158
      DIMENSION RVBO(15)          ,RHOR(10)           ,RATOM(20)       AFAM     159
      DIMENSION TITLE1(18)        ,TITLE2(18)                          AFAM     160
      DIMENSION V(25)             ,VBO(30)                             AFAM     161
C                                                                      AFAM     162
      COMMON /CFMTA / FMTA                                             AFAM     163
      COMMON /CLUEM / LKLUE ,KLUE                                      AFAM     164
      COMMON /CLUEF / LKLUEF,KLUEF                                     AFAM     165
      COMMON /CTAPES/ ITAPES                                           AFAM     166
      COMMON /COMRWP/ ITAPER,ITAPEW,ITAPEP                             AFAM     167
      COMMON /CTABLE/ KTABLE,NPASS ,NROWS, NCOLS , NCOLST,KTABLO,NPAGEA AFAM    168
     1         ,ITAPET                                                 AFAM     169
      COMMON /CTSHF / LTSHF ,TSHF                                      AFAM     170
      COMMON /CTSH  / KTSH  ,LTSH  ,TSH                                AFAM     171
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```
      COMMON /COMA/ LC , BR                                             AFAM     173
      COMMON /MODD  / B      ,DETAD ,WW    ,OMGR  ,NC                   AFAM     174
      COMMON /FLUTAN/ FMACH  ,BETA  ,VBO   ,RVBO  ,NRVBO                AFAM     175
      COMMON /FLUTB / V      ,NV                                        AFAM     176
      COMMON /FLUTC / RHOR   ,NOTI  ,NINZ  ,RATOM                       AFAM     177
      COMMON /FLUTV / VA     ,VB    ,FLO   ,FHI   ,IE    ,NQZ   ,NVTOT  AFAM     178
      COMMON /FLUTQ / QMWT   ,QWT                                       AFAM     179
      COMMON /PRPL  / GMAX   ,GMIN  ,FRMAX ,FRMIN ,VMAX  ,VMIN          AFAM     180
      COMMON /CALCP / TITLE1,TITLE2,DUB    ,FUB   ,VUB   ,DLB   ,FLB    AFAM     181
     1               ,VLB    ,IPLOT ,LSD   ,DSCALE,FSCALE,VSCALE,DPLEN  AFAM     182
     2               ,FRLEN  ,VLEN  ,XDT                                AFAM     183
      COMMON/KLUES/ KLUSE,KLUNAL,IRED,KLUMD,KLUBAL,MSADD,NPAS, IDNOPT,  AFAM     184
     1              VDES,EPS1,DWMAX,NBAR,NFIX,D,DEL,EPS2,NCYC,NNN,IBAND, AFAM     185
     2              IFIN,KLUB,KLUQ,MORBAL,DBAL                          AFAM     186
C                                                                       AFAM     187
C                                                                       AFAM     188
C INITIAL CONDITIONS                                                    AFAM     189
C.... PSN(100) TO PSN(150) ....                                        AFAM     190
  100 CONTINUE                                                          AFAM     191
      LTSHR  =  LTSH                                                    AFAM     192
      IF (KTSH .EQ. YES) LTSHR = LTSH-2                                 AFAM     193
      DATA FAOOR  /4HFAOO/                                              AFAM     194
      NCC     =  10                                                     AFAM     195
      NKLUEF=LKLUEF                                                     AFAM     196
      ISAVFO =  ITAPES(24)                                              AFAM     197
C                                                                       AFAM     198
C                                                                       AFAM     199
C PRINT TITLE FOR AUTOMATED FLUTTER ANALYSIS MODULE                     AFAM     200
C                                                                       AFAM     201
      CALL TAFAM                                                        AFAM     202
C                                                                       AFAM     203
C                                                                       AFAM     204
C READ INPUT DATA                                                       AFAM     205
C.... PSN(190) TO PSN(290) ....                                        AFAM     206
  190 REWIND ITAPER                                                     AFAM     207
  195 READ (ITAPER,5060) FAOOD                                          AFAM     208
      IF (FAOOD .NE. FAOOR) GO TO 195                                   AFAM     209
      READ (ITAPER,FMTA) (TSHF(L), L=1,LTSHR)                           AFAM     210
      CALL CLUES (ITAPER,NCC,NKLUEF,KLUEF)                              AFAM     211
      KDUMMY =  KLUEF(1)                                                AFAM     212
      READ (ITAPER,50)   LC                                             AFAM     213
      DO 210 L=1,LTSH                                                   AFAM     214
  210 TSH(L) =  TSHF(L)                                                 AFAM     215
C                                                                       AFAM     216
C                                                                       AFAM     217
C READ FREQUENCIES, GENERALIZED MASSES, AND MODES  FROM CARDS AND OR    AFAM     218
C TAPE.  CHOOSE APPROPRIATE MODES FOR INTERPOLATIONS                    AFAM     219
C                                                                       AFAM     220
      CALL POOL                                                         AFAM     221
      CALL PROGNA (4H(POO, 4HL  ))                                      AFAM     222
      CALL TIMEB (23,23HFROM AFAM, AFTER POOL  )                        AFAM     223
C                                                                       AFAM     224
   70 IFTP     =  LC(21)                                                AFAM     225
      KPLOTF =  LC(14) + 1                                              AFAM     226
C                                                                       AFAM     227
      GO TO (500, 600, 700), IFTP                                       AFAM     228
C                                                                       AFAM     229
```

```
      C                                                                 AFAM     230
      C SUBSONIC AERODYNAMICS USING DOUBLET LATTICE PROCEDURE            AFAM     231
      C                                                                 AFAM     232
        500 CONTINUE                                                    AFAM     233
            CALL RODDEN                                                 AFAM     234
            CALL PROGNA (4H(ROD, 4HDEN))                                AFAM     235
            CALL TIMEB (23,23HFROM AFAM, AFTER RODDEN)                  AFAM     236
            GO TO 800                                                   AFAM     237
      C                                                                 AFAM     238
      C                                                                 AFAM     239
      C SUPERSONIC AERODYNAMICS USING MACH BOX PROCEDURE                 AFAM     240
      C                                                                 AFAM     241
        600 CONTINUE                                                    AFAM     242
            CALL MACH                                                   AFAM     243
            CALL PROGNA (4H(MAC, 4HK  ))                                AFAM     244
            CALL TIMEB (23,23HFROM AFAM, AFTER MACH  )                  AFAM     245
            GO TO 800                                                   AFAM     246
      C                                                                 AFAM     247
      C                                                                 AFAM     248
      C SUBSONIC AERODYNAMICS USING COLLOCATION PROCEDURE                AFAM     249
      C                                                                 AFAM     250
        700 CONTINUE                                                    AFAM     251
            CALL KERN                                                   AFAM     252
            CALL PROGNA (4H(KER, 4HN  ))                                AFAM     253
            CALL TIMEB (23,23HFROM AFAM, AFTER KERN  )                  AFAM     254
        800 CONTINUE                                                    AFAM     255
      C                                                                 AFAM     256
      C                                                                 AFAM     257
      C FLUTTER SOLUTION                                                AFAM     258
      C                                                                 AFAM     259
            IF (LC(1) .EQ. 0) GO TO 990                                 AFAM     260
            CALL SOLFLT (ISAVFO)                                        AFAM     261
        990 CONTINUE                                                    AFAM     262
            CALL PROGNA (4H(AFA, 4HM  ))                                AFAM     263
            CALL TIMEB (35, 35HFROM AFAM - END OF FLUTTER ANALYSIS)     AFAM     264
      C                                                                 AFAM     265
      C                                                                 AFAM     266
      C                                                                 AFAM     267
      C FORMATS                                                         AFAM     268
      C                                                                 AFAM     269
         50 FORMAT (10I5)                                               AFAM     270
       5060 FORMAT (18A4)                                               AFAM     271
      C                                                                 AFAM     272
            RETURN                                                      AFAM     273
            END                                                         AFAM     274
```

CARD NR.	SEVERITY	DETAILS	DIAGNOSIS OF PROBLEM
227	I		AN IF STATEMENT MAY BE MORE EFFICIENT THAN A 2 OR 3 BRANCH COMPUTED GO TO STATEMENT.

```
SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS       DEF LINE      REFERENCES
    3  AFAM           146          272

VARIABLES       SN  TYPE             RELOCATION
      0  B          COMPLEX    ARRAY    MODD          REFS       149       155       173
      1  BETA       REAL                FLUTAN        REFS       174
     50  BR         REAL                COMA          REFS       172
     15  D          REAL                KLUES         REFS       183
     27  DBAL       REAL                KLUES         REFS       183
     16  DEL        REAL                KLUES         REFS       183
   6200  DETAD      COMPLEX    ARRAY    MODD          REFS       149       155       173
     47  DLB        REAL                CALCP         REFS       180
     57  DPLEN      REAL                CALCP         REFS       180
     54  DSCALE     REAL                CALCP         REFS       180
     44  DUB        REAL                CALCP         REFS       180
     12  DWMAX      REAL                KLUES         REFS       183
     11  EPS1       REAL                KLUES         REFS       183
     17  EPS2       REAL                KLUES         REFS       183
    215  FAOOD      REAL                              REFS       208     DEFINED     207
    162  FAOOR      REAL                              REFS       208     DEFINED     193
      3  FHI        REAL                FLUTV         REFS       177
     50  FLB        REAL                CALCP         REFS       180
      2  FLO        REAL                FLUTV         REFS       177
      0  FMACH      REAL                FLUTAN        REFS       174
      0  FMTA       REAL       ARRAY    CFMTA         REFS       151       162       209
     60  FRLEN      REAL                CALCP         REFS       180
      2  FRMAX      REAL                PRPL          REFS       179
      3  FRMIN      REAL                PRPL          REFS       179
     55  FSCALE     REAL                CALCP         REFS       180
     45  FUB        REAL                CALCP         REFS       180
      0  GMAX       REAL                PRPL          REFS       179
      1  GMIN       REAL                PRPL          REFS       179
     22  IBAND      INTEGER             KLUES         REFS       183
      7  IDNOPT     INTEGER             KLUES         REFS       123
      4  IE         INTEGER             FLUTV         REFS       177
     23  IFIN       INTEGER             KLUES         REFS       183
    220  IFTP       INTEGER                           REFS       227     DEFINED     224
     52  IPLOT      INTEGER             CALCP         REFS       180
      2  IRED       INTEGER             KLUES         REFS       183
    214  ISAVFO     INTEGER                           REFS       260     DEFINED     196
      2  ITAPEP     INTEGER             COMRWP        REFS       166
      0  ITAPER     INTEGER             COMRWP        REFS       166       210    I/O REFS     206       207       209       212
      0  ITAPES     INTEGER    ARRAY    CTAPES        REFS       152       165       196
      7  ITAPET     INTEGER             CTABLE        REFS       167
      1  ITAPEW     INTEGER             COMRWP        REFS       166
    217  KDUMMY   * INTEGER                         DEFINED      211
     24  KLUB       INTEGER             KLUES         REFS       183
      4  KLUBAL     INTEGER             KLUES         REFS       183
      1  KLUE       INTEGER    ARRAY    CLUEM         REFS       152       163
      1  KLUEF      INTEGER    ARRAY    CLUEF         REFS       152       164       210       211
      3  KLUMD      INTEGER             KLUES         REFS       183
      1  KLUNAL     INTEGER             KLUES         REFS       183
     25  KLUQ       INTEGER             KLUES         REFS       183
      0  KLUSE      INTEGER             KLUES         REFS       183
```

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VARIABLES     SN  TYPE            RELOCATION
     0  KPLOTF    INTEGER                F.P.      DEFINED     146       225
     0  KTABLE    INTEGER             CTABLE         REFS      167
     5  KTABLO    INTEGER             CTABLE         REFS      167
     0  KTSH      INTEGER             CTSH           REFS      170       192
   216  L         INTEGER                            REFS      209     2*214   DEFINED       209       213
     0  LC        INTEGER    ARRAY    COMA           REFS      154       172       224       225       259
                                                   DEFINED     212
     0  LKLUE     INTEGER             CLUEM          REFS      163
     0  LKLUEF    INTEGER             CLUEF          REFS      164       195
    53  LSD       INTEGER             CALCP          REFS      180
     1  LTSH      INTEGER             CTSH           REFS      170       191       192       213
     0  LTSHF     INTEGER             CTSHF          REFS      169
   211  LTSHR     INTEGER                            REFS      209   DEFINED       191       192
    26  MORBAL    INTEGER             KLUES          REFS      183
     5  MSADD     INTEGER             KLUES          REFS      183
    13  NBAR      INTEGER             KLUES          REFS      183
 17550  NC        INTEGER             MODD           REFS      173
   212  NCC       INTEGER                            REFS      210   DEFINED       194
     3  NCOLS     INTEGER             CTABLE         REFS      167
     4  NCOLST    INTEGER             CTABLE         REFS      167
    20  NCYC      INTEGER             KLUES          REFS      183
    14  NFIX      INTEGER             KLUES          REFS      183
    43  NINZ      INTEGER    ARRAY    FLUTC          REFS      156       176
   213  NKLUEF    INTEGER                            REFS      210   DEFINED       195
    21  NNN       INTEGER             KLUES          REFS      183
     0  NO        INTEGER             CONSTS         REFS      171
    12  NOTI      INTEGER    ARRAY    FLUTC          REFS      156       176
     6  NPAGEA    INTEGER             CTABLE         REFS      167
     6  NPAS      INTEGER             KLUES          REFS      183
     1  NPASS     INTEGER             CTABLE         REFS      167
     5  NQZ       INTEGER             FLUTV          REFS      177
     2  NROWS     INTEGER             CTABLE         REFS      167
    57  NRVBO     INTEGER             FLUTAN         REFS      174
    31  NV        INTEGER             FLUTB          REFS      175
     6  NVTOT     INTEGER             FLUTV          REFS      177
 17500  OMGR      REAL       ARRAY    MODD           REFS      155       173
     0  QMWT      REAL       ARRAY    FLUTQ          REFS      157       178
   310  QWT       REAL       ARRAY    FLUTQ          REFS      157       178
  2013  RATOM     REAL       ARRAY    FLUTC          REFS      158       176
     0  RHOR      REAL       ARRAY    FLUTC          REFS      158       176
    40  RVBO      REAL       ARRAY    FLUTAN         REFS      158       174
     0  TITLE1    REAL       ARRAY    CALCP          REFS      159       180
    22  TITLE2    REAL       ARRAY    CALCP          REFS      159       180
     2  TSH       REAL       ARRAY    CTSH           REFS      153       170   DEFINED       214
     1  TSHF      REAL       ARRAY    CTSHF          REFS      153       169       214   DEFINED       209
     0  V         REAL       ARRAY    FLUTB          REFS      160       175
     0  VA        REAL                FLUTV          REFS      177
     1  VB        REAL                FLUTV          REFS      177
     2  VBO       REAL       ARRAY    FLUTAN         REFS      160       174
    10  VDES      REAL                KLUES          REFS      183
    51  VLB       REAL                CALCP          REFS      180
    61  VLEN      REAL                CALCP          REFS      180
     4  VMAX      REAL                PRPL           REFS      179
     5  VMIN      REAL                PRPL           REFS      179
    56  VSCALE    REAL                CALCP          REFS      180
    46  VUB       REAL                CALCP          REFS      180
 14400  WW        REAL       ARRAY    MODD           REFS      155       173
```

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VARIABLES     SN  TYPE            RELOCATION
   62  XDT         REAL              CALCP       REFS       180
    1  YES         INTEGER           CONSTS      REFS       148        171        192
       VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS           TYPE   ARGS         REFERENCES
       CLUES                 4              210
       KERN                  0              251
       MACH                  0              242
       POOL                  0              220
       PROGNA                2              221        234        243        252        262
       RODDEN                0              233
       SOLFLT                1              260
       TAFAM                 0              201
       TIMEB                 2              222        235        244        253        263

STATEMENT LABELS               DEF LINE    REFERENCES
  203  50       FMT              269          212
    0  70           INACTIVE     224
    0  100          INACTIVE     190
    0  190          INACTIVE     206
   20  195                       207          208
    0  210                       214          213
   64  500                       232          227
   72  600                       241          227
  100  700                       250          227
  105  800                       254          236        245
  110  990                       261          259
  205  5060     FMT              270          207

LOOPS  LABEL     INDEX      FROM-TO     LENGTH     PROPERTIES
   41  210       L           213 214       3B        INSTACK

COMMON BLOCKS   LENGTH     MEMBERS - BIAS NAME(LENGTH)
       CFMTA         1               0 FMTA     (1)
       CLUEM        81               0 LKLUE    (1)                1 KLUE     (80)
       CLUEF        21               0 LKLUEF   (1)                1 KLUEF    (20)
       CTAPES       50               0 ITAPES   (50)
       COMRWP        3               0 ITAPER   (1)                1 ITAPEW   (1)              2 ITAPEP  (1)
       CTABLE        8               0 KTABLE   (1)                1 NPASS    (1)              2 NROWS   (1)
                                     3 NCOLS    (1)                4 NCOLST   (1)              5 KTABLO  (1)
                                     6 NPAGEA   (1)                7 ITAPET   (1)
       CTSHF         2               0 LTSHF    (1)                1 TSHF     (1)
       CTSH          3               0 KTSH     (1)                1 LTSH     (1)              2 TSH     (1)
       CONSTS        2               0 NO       (1)                1 YES      (1)
       COMA         41               0 LC       (40)              40 BR       (1)
       MODD       8041               0 B        (3200)          3200 DETAD    (3200)        6400 WW      (1600)
                                  8000 OMGR     (40)            8040 NC       (1)
       FLUTAN       48               0 FMACH    (1)                1 BETA     (1)              2 VBO     (30)
                                    32 RVBO     (15)              47 NRVBO    (1)
       FLUTB        26               0 V        (25)              25 NV       (1)
       FLUTC      1055               0 RHOR     (10)              10 NOTI     (25)            35 NINZ    (1000)
                                  1035 RATOM    (20)
       FLUTV         7               0 VA       (1)                1 VB       (1)              2 FLO     (1)
                                     3 FHI      (1)                4 IE       (1)              5 NQZ     (1)
                                     6 NVTOT    (1)
       FLUTQ       205               0 QMWT     (200)            200 QWT      (5)
       PRPL          6               0 GMAX     (1)                1 GMIN     (1)              2 FRMAX   (1)
```

```
COMMON BLOCKS   LENGTH     MEMBERS - BIAS NAME(LENGTH)
                                    3 FRMIN  (1)          4 VMAX   (1)          5 VMIN   (1)
      CALCP         51              0 TITLE1 (18)        18 TITLE2 (18)        36 DUB    (1)
                                   37 FUB    (1)         38 VUB    (1)         39 DLB    (1)
                                   40 FLB    (1)         41 VLB    (1)         42 IPLOT  (1)
                                   43 LSD    (1)         44 DSCALE (1)         45 FSCALE (1)
                                   46 VSCALE (1)         47 DPLEN  (1)         48 FRLEN  (1)
                                   49 VLEN   (1)         50 XDT    (1)
      KLUES         24              0 KLUSE  (1)          1 KLUNAL (1)          2 IRED   (1)
                                    3 KLUMD  (1)          4 KLUBAL (1)          5 MSADD  (1)
                                    6 NPAS   (1)          7 IDNOPT (1)          8 VDES   (1)
                                    9 EPS1   (1)         10 DWMAX  (1)         11 NBAR   (1)
                                   12 NFIX   (1)         13 D      (1)         14 DEL    (1)
                                   15 EPS2   (1)         16 NCYC   (1)         17 NNN    (1)
                                   18 IBAND  (1)         19 IFIN   (1)         20 KLUB   (1)
                                   21 KLUQ   (1)         22 MORBAL (1)         23 DBAL   (1)

STATISTICS
  PROGRAM LENGTH                 272B      186
  CM LABELED COMMON LENGTH     22713B     9675
        52000B CM USED
```

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      C                                                                 TAFAM     2
      C45700. SUB. TAFAM (TITLE FOR AUTOMATED FLUTTER ANALYSIS MODULE)  TAFAM     3
      C                                                                 TAFAM     4
      C*************************************************************** TAFAM     5
      C                                                               * TAFAM     6
      C***  SUBROUTINE TAFAM  ****************************************** TAFAM     7
      C                                                               * TAFAM     8
      C***  OBJECTIVE  ************************************************* TAFAM     9
      C     ---------                                                 * TAFAM    10
      C     PRINTS THE TITLE PAGE FOR THE AUTOMATED FLUTTER ANALYSIS  * TAFAM    11
      C     MODULE                                                    * TAFAM    12
      C                                                               * TAFAM    13
      C*************************************************************** TAFAM    14
      C                                                                 TAFAM    15
            SUBROUTINE TAFAM                                            TAFAM    16
      C                                                                 TAFAM    17
            DIMENSION AFFDL(4)                                          TAFAM    18
      C                                                                 TAFAM    19
            COMMON /COMRWP/ ITAPER,ITAPEW,ITAPEP                        TAFAM    20
            COMMON /CLIST / KOUNT ,KPAGE ,LINES ,LINEST,KLABEL,KTPAGE,NPAGE TAFAM 21
           1               ,KBPAGE,LINESG,KOUNTH,KOUNTI                  TAFAM    22
            COMMON /CTABLE/ KTABLE,NPASS ,NROWS ,NCOLS ,NCOLST,KTABLO,NPAGEA TAFAM 23
           1               ,ITAPET                                      TAFAM    24
            COMMON /CAFFDL/ AFFDL                                       TAFAM    25
      C                                                                 TAFAM    26
      C                                                                 TAFAM    27
      C PREPARE TABLE OF CONTENTS                                       TAFAM    28
      C                                                                 TAFAM    29
            KOUNT  =  LINES                                             TAFAM    30
            CALL TITLES (-1)                                            TAFAM    31
            NCOLS  =  0                                                 TAFAM    32
            NROWS  =  2                                                 TAFAM    33
            KTABLE =  2                                                 TAFAM    34
            CALL PTABLE (1,60,60                                        TAFAM    35
           *   H ***    *****    ***    *   *                         ) TAFAM    36
            NROWS  =  0                                                 TAFAM    37
            KTABLE =  2                                                 TAFAM    38
            CALL PTABLE (1,60,60                                        TAFAM    39
           *   H*   *   *       *   *   ** **          AUTOMATED      ) TAFAM    40
            KTABLE =  2                                                 TAFAM    41
            CALL PTABLE (1,60,60                                        TAFAM    42
           *   H***** - ****  - ***** - * * *           FLUTTER       ) TAFAM    43
            KTABLE =  2                                                 TAFAM    44
            CALL PTABLE (1,60,60                                        TAFAM    45
           *   H*   *   *       *   *   * * *           ANALYSIS      ) TAFAM    46
            KTABLE =  2                                                 TAFAM    47
            CALL PTABLE (2,60,60                                        TAFAM    48
           *   H*   *   *       *   *   * * *            MODULE       ) TAFAM    49
            KOUNT  =  LINES                                             TAFAM    50
      C                                                                 TAFAM    51
      C                                                                 TAFAM    52
      C LIST TITLE PAGE                                                 TAFAM    53
      C                                                                 TAFAM    54
            WRITE (ITAPEW,100)                                          TAFAM    55
            WRITE (ITAPEW,105)                                          TAFAM    56
            WRITE (ITAPEW,110)                                          TAFAM    57
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      WRITE (ITAPEW,120) AFFDL                                         TAFAM    59
      WRITE (ITAPEW,125)                                               TAFAM    60
      WRITE (ITAPEW,130)                                               TAFAM    61
      WRITE (ITAPEW,135)                                               TAFAM    62
      WRITE (ITAPEW,140)                                               TAFAM    63
      WRITE (ITAPEW,145)                                               TAFAM    64
      WRITE (ITAPEW,150)                                               TAFAM    65
      WRITE (ITAPEW,155)                                               TAFAM    66
      WRITE (ITAPEW,160)                                               TAFAM    67
      WRITE (ITAPEW,165)                                               TAFAM    68
      WRITE (ITAPEW,170)                                               TAFAM    69
      WRITE (ITAPEW,175)                                               TAFAM    70
  100 FORMAT (                                                         TAFAM    71
     *    5X,122(1H*)                                                  TAFAM    72
     *,/, 5X,1H*,120X,1H*                                              TAFAM    73
     *,/, 5X,1H*,15X                                                   TAFAM    74
     A,13H     A                                                       TAFAM    75
     *,52X, 36H....................................,4X,1H*             TAFAM    76
     *,/, 5X,1H*,15X                                                   TAFAM    77
     A,13H    AAA                                                      TAFAM    78
     *,52X, 36H.                                  .,4X,1H*             TAFAM    79
     *,/, 5X,1H*,15X                                                   TAFAM    80
     A,13H   AAAAA                                                     TAFAM    81
     *,52X, 36H.          **** FASTOP ****        .,4X,1H*             TAFAM    82
     *,/, 5X,1H*,15X                                                   TAFAM    83
     A,13H   AAAAA                                                     TAFAM    84
     *,52X, 36H.      FLUTTER AND STRUCTURAL      .,4X,1H*             TAFAM    85
     *,/, 5X,1H*,15X                                                   TAFAM    86
     A,13H  AAA AAA                                                    TAFAM    87
     *,52X, 36H.       OPTIMIZATION PROGRAM       .,4X,1H*)            TAFAM    88
  105 FORMAT (                                                         TAFAM    89
     *    5X,1H*,15X                                                   TAFAM    90
     A,13H  AAA AAA                                                    TAFAM    91
     *,52X, 36H.                                  .,4X,1H*             TAFAM    92
     *,/, 5X,1H*,15X                                                   TAFAM    93
     A,13H  AAA AAA                                                    TAFAM    94
     *,52X, 36H.           **** FOP ****          .,4X,1H*             TAFAM    95
     *,/, 5X,1H*,15X                                                   TAFAM    96
     A,13H  AAA AAA                                                    TAFAM    97
     *,52X, 36H.   FLUTTER OPTIMIZATION PACKAGE   .,4X,1H*             TAFAM    98
     *,/, 5X,1H*,15X                                                   TAFAM    99
     A,13H  AAA AAA                                                    TAFAM   100
     *,52X, 36H.                                  .,4X,1H*             TAFAM   101
     *,/, 5X,1H*,15X                                                   TAFAM   102
     A,13H AAAAAAAAA                                                   TAFAM   103
     *,52X, 36H.           **** AFAM ****         .,4X,1H*)            TAFAM   104
  110 FORMAT (                                                         TAFAM   105
     *    5X,1H*,15X                                                   TAFAM   106
     A,13H AAAAAAAAA                                                   TAFAM   107
     *,13X                                                             TAFAM   108
     F,13HFFFFFFFFFFFFF                                                TAFAM   109
     *,26X, 36H.            AUTOMATED             .,4X,1H*             TAFAM   110
     *,/, 5X,1H*,15X                                                   TAFAM   111
     A,13H AAAA AAAA                                                   TAFAM   112
     *,13X                                                             TAFAM   113
     F,13HFFFFFFFFFFFFF                                                TAFAM   114
     *,26X, 36H.     FLUTTER ANALYSIS MODULE      .4X,1H*              TAFAM   115
```

```
          *,/, 5X,1H*,15X                                                TAFAM   116
          A,13H  AAA    AAA                                              TAFAM   117
          *,13X                                                          TAFAM   118
          F,13H FFF      FFF                                             TAFAM   119
          *,26X, 36H.                                     ..,4X,1H*)     TAFAM   120
      115 FORMAT (                                                       TAFAM   121
          *    5X,1H*,15X                                                TAFAM   122
          A,13H  AAA    AAA                                              TAFAM   123
          *,13X                                                          TAFAM   124
          F,13H FFF      FFF                                             TAFAM   125
          *,26X, 36H...................................,4X,1H*           TAFAM   126
          *,/, 5X,1H*,15X                                                TAFAM   127
          A,13H AAA      AAA                                             TAFAM   128
          *,13X                                                          TAFAM   129
          F,13H FFF                                                      TAFAM   130
          *,26X, 36H.                                     ..,4X,1H*      TAFAM   131
          *,/, 5X,1H*,15X                                                TAFAM   132
          A,13H AAA      AAA                                             TAFAM   133
          *,13X                                                          TAFAM   134
          F,13H FFF                                                      TAFAM   135
          *,26X, 36H.            AIR FORCE                ..,4X,1H*)     TAFAM   136
      120 FORMAT (                                                       TAFAM   137
          *    5X,1H*,15X                                                TAFAM   138
          A,13H AAA      AAA                                             TAFAM   139
          *,13X                                                          TAFAM   140
          F,13H FFF                                                      TAFAM   141
          *,26X, 36H.    FLIGHT DYNAMICS LABORATORY     ..,4X,1H*        TAFAM   142
          *,/, 5X,1H*,15X                                                TAFAM   143
          A,13HAAA        AAA                                            TAFAM   144
          *,13X                                                          TAFAM   145
          F,13H FFF                                                      TAFAM   146
          *,26X, 36H.                                     ..,4X,1H*      TAFAM   147
          *,/, 5X,1H*,15X                                                TAFAM   148
          A,13HAAA        AAA                                            TAFAM   149
          *,13X                                                          TAFAM   150
          F,13H FFF                                                      TAFAM   151
          *,26X, 10H.           ,4A4, 10H          ..,4X,1H*)            TAFAM   152
      125 FORMAT (                                                       TAFAM   153
          *    5X,1H*,15X                                                TAFAM   154
          A,13HAAA       AAA                                             TAFAM   155
          *,13X                                                          TAFAM   156
          F,13H FFFFFFFFF                                                TAFAM   157
          *,26X, 36H.                                     ..,4X,1H*      TAFAM   158
          *,/, 5X,1H*,41X                                                TAFAM   159
          F,13H FFFFFFFFF                                                TAFAM   160
          *,13X                                                          TAFAM   161
          A,13H      A                                                   TAFAM   162
          *,    36H...................................,4X,1H*           TAFAM   163
          *,/, 5X,1H*,41X                                                TAFAM   164
          F,13H FFF                                                      TAFAM   165
          *,13X                                                          TAFAM   166
          A,13H      AAA                                                 TAFAM   167
          *,40X,1H*)                                                     TAFAM   168
      130 FORMAT (                                                       TAFAM   169
          *    5X,1H*,41X                                                TAFAM   170
          F,13H FFF                                                      TAFAM   171
          *,13X                                                          TAFAM   172
```

```
             A,13H    AAAAA                                   TAFAM     173
             *,40X,1H*                                        TAFAM     174
             *,/, 5X,1H*,41X                                  TAFAM     175
             F,13H FFF                                        TAFAM     176
             *,13X                                            TAFAM     177
             A,13H    AAAAA                                   TAFAM     178
             *,40X, 1H*                                       TAFAM     179
             *,/, 5X,1H*,41X                                  TAFAM     180
             F,13H FFF                                        TAFAM     181
             *,13X                                            TAFAM     182
             A,13H   AAA AAA                                  TAFAM     183
             *,40X,1H*)                                       TAFAM     184
         135 FORMAT (                                         TAFAM     185
             *     5X,1H*,41X                                 TAFAM     186
             F,13H FFF                                        TAFAM     187
             *,13X                                            TAFAM     188
             A,13H   AAA AAA                                  TAFAM     189
             *,40X,1H*                                        TAFAM     190
             *,/, 5X,1H*,41X                                  TAFAM     191
             F,13H FFF                                        TAFAM     192
             *,13X                                            TAFAM     193
             A,13H   AAA AAA                                  TAFAM     194
             *,40X,1H*                                        TAFAM     195
             *,/, 5X,1H*,41X                                  TAFAM     196
             F,13H FFF                                        TAFAM     197
             *,13X                                            TAFAM     198
             A,13H   AAA AAA                                  TAFAM     199
             *,40X,1H*)                                       TAFAM     200
         140 FORMAT (                                         TAFAM     201
             *     5X,1H*,41X                                 TAFAM     202
             F,13HFFFF                                        TAFAM     203
             *,13X                                            TAFAM     204
             A,13H   AAA AAA                                  TAFAM     205
             *,40X,1H*                                        TAFAM     206
             *,/, 5X,1H*,41X                                  TAFAM     207
             F,13HFFFF                                        TAFAM     208
             *,13X                                            TAFAM     209
             A,13H  AAAAAAAAA                                 TAFAM     210
             *,40X,1H*                                        TAFAM     211
             *,/, 5X,1H*,67X                                  TAFAM     212
             A,13H  AAAAAAAAA                                 TAFAM     213
             *,13X                                            TAFAM     214
             M,13HMMM       MMM                               TAFAM     215
             *,14X,1H*)                                       TAFAM     216
         145 FORMAT (                                         TAFAM     217
             *     5X,1H*,2X                                  TAFAM     218
             *,65X                                            TAFAM     219
             A,13H  AAAA AAAA                                 TAFAM     220
             *,13X                                            TAFAM     221
             M,13HMMM       MMM                               TAFAM     222
             *,14X,1H*                                        TAFAM     223
             *,/, 5X,1H*,2X                                   TAFAM     224
             *,65X                                            TAFAM     225
             A,13H  AAA    AAA                                TAFAM     226
             *,13X                                            TAFAM     227
             M,13HMMMM      MMMM                              TAFAM     228
             *,14X,1H*                                        TAFAM     229
```

```
      675 BUFFER(I) =  QZ(J,I)                                              POOL     173
      685 CALL RNRW (MTAP49,BUFFER,LC2)                                     POOL     174
          REWIND MTAP49                                                     POOL     175
C         STORE PERTINENT INFORMATION FOR USE IN INDIVIDUAL                 POOL     176
C         AERODYNAMIC THEORIES                                              POOL     177
C                                                                           POOL     178
C                                                                           POOL     179
          CALL FLINFO                                                       POOL     180
C                                                                           POOL     181
C                                                                           POOL     182
C FORMATS                                                                   POOL     183
C                                                                           POOL     184
   20 FORMAT(10I5)                                                          POOL     185
   40 FORMAT (7E10.3)                                                       POOL     186
  710 FORMAT(3(2I5,E10.3))                                                  POOL     187
 1000 FORMAT (10X, 42HVIBRATION DATA HAS BEEN ENTERED FROM CARDS)           POOL     188
 1100 FORMAT (10X, 56HVIBRATION DATA HAS BEEN ENTERED FROM THREE FILES O POOL     189
     1N TAPE)                                                               POOL     190
 1200 FORMAT (10X, 53HVIBRATION DATA HAS BEEN ENTERED FROM ONE FILE ON T POOL     191
     1APE)                                                                  POOL     192
 2000 FORMAT (10X,41HENTER VIBRATION DATA FOR FLUTTER ANALYSIS              POOL     193
     1       ,/10X,41(1H-))                                                 POOL     194
C                                                                           POOL     195
          RETURN                                                            POOL     196
          END                                                               POOL     197
```

CARD NR.	SEVERITY	DETAILS	DIAGNOSIS OF PROBLEM
53	I		AN IF STATEMENT MAY BE MORE EFFICIENT THAN A 2 OR 3 BRANCH COMPUTED GO TO STATEMENT.

SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS		DEF LINE	REFERENCES
1	POOL	1	195

VARIABLES		SN	TYPE		RELOCATION								
0	B		COMPLEX	ARRAY	MODD	REFS	10	12					
50	BR		REAL		COMA	REFS	13						
755	BUFFER		REAL	ARRAY		REFS	5	38	88	92	100	105	113
						115	135	145	173	DEFINED	131	140	172
242	CSCL		REAL		FLUT	REFS	24						
6200	DETAD		COMPLEX	ARRAY	MODD	REFS	10	12					
22165	DUMMY		REAL	ARRAY		REFS	6	86	97	110			
726	I		INTEGER			REFS	63	71	85	91	92	104	105
						126	131	134	135	144	145	153	169
						2*172	DEFINED	62	65	71	85	90	103
						126	131	133	143	151	168	171	
743	IDMAS		INTEGER			REFS	97	DEFINED	84				
742	IDMODE		INTEGER			REFS	86	DEFINED	84				
744	IDOMG		INTEGER			REFS	110	DEFINED	84				

```
      OMG(I2)  =  BUFFER(J)
      I2 = I2 + 1
  680 CONTINUE
      CALL PLB (1,1,ITAPEW)
      WRITE (ITAPEW,1100)
      GO TO 600
C
C
C READ VIBRATION DATA FROM TAPE USING ONE FILE ONLY
C
  500 CONTINUE
      READ (ITAPER,20) (IFLMD(I), I=1,LC2)
      CALL FSIO (6HIDVIBA,IDVIBA,JDVIBA,KDVIBA,LOCFIL,2)
      REWIND IDVIBA
      MTAP4  =  IDVIBA
      READ(MTAP4) NC,NM
      READ (MTAP4) (BUFFER(I), I=1,NM)
      I1  =  1
      DO 3  I=1,NM
      IF ( I .NE. IFLMD(I1) )      GO TO 3
      OMG(I1)  =  BUFFER(I)
      I1  =  I1 + 1
    3 CONTINUE
      I2  =  1
      DO 5  J=1,NM
      READ (MTAP4)  (BUFFER(II) , II=1,NM)
      IF ( J .NE. IFLMD(I2) )      GO TO 5
      I1  =  1
      DO 6  I=1,NM
      IF ( I .NE. IFLMD(I1) )      GO TO 6
      WW (I2,I1)  =  BUFFER(I)
      I1  =  I1 + 1
    6 CONTINUE
      I2  =  I2 + 1
    5 CONTINUE
      I1  =  1
      DO 7  I=1,NM
      CALL RNRW (-MTAP4,QZ(1,I1),NC)
      IF (I .EQ. IFLMD(I1)) I1 = I1+1
    7 CONTINUE
      CALL FCLOSE (IDVIBA,JDVIBA,2)
      CALL PLB (1,1,ITAPEW)
      WRITE (ITAPEW,1200)
C
C
C STORE SELECTED MODE SHAPES ON TAPE FOR USE IN VARIOUS AERODYNAMIC
C THEORIES AND FLUTTER.
C INFORMATION IS STORED IN THE FOLLOWING ORDER.
C  1. ALL COORDINATES ARE STORED ON TAPE FOR EACH MODE.
C  2. ALL MODES ARE STORED ON TAPE FOR EACH COORDINATE.
C
  600 CONTINUE
      REWIND MTAP49
      DO 655 I=1,LC2
  655 CALL RNRW (MTAP49,QZ(1,I),NC)
      DO 685 J=1,NC
      DO 675 I=1,LC2
```

```
C
C READ VIBRATION DATA FROM CARDS
C
  300 READ (ITAPER,20) NC
      DO 60 I=1,LC2
   60 READ (ITAPER,40) (QZ(K,I), K=1,NC)
      READ (ITAPER,20)  NCARD
      DO 25  I=1,NCARD
      READ (ITAPER,710)  I1,J1,VALU1,I2,J2,VALU2,I3,J3,VALU3
      IF (I1.NE.0.AND.J1.NE.0) WW(I1,J1) = VALU1
      IF (I2.NE.0.AND.J2.NE.0) WW(I2,J2) = VALU2
      IF (I3.NE.0.AND.J3.NE.0) WW(I3,J3) = VALU3
   25 CONTINUE
      READ (ITAPER,40) (OMG(I),I=1,LC2)
      CALL PLB (1,1,ITAPEW)
      WRITE (ITAPEW,1000)
      GO TO 600
C
C
C READ VIBRATION DATA FROM TAPE USING THREE FILES
C
  610 CONTINUE
CIBM  BEGINNING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS
C     CALL DINIT (12,8HFT12F001)
C     MTAP4  =  ITAPES(12)
CIBM  ENDING    OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS
      READ (ITAPER,20) IDMODE, IDMAS, IDOMG
      READ (ITAPER,20)   (IFLMD(I), I=1,LC2)
      CALL GEDLAB (6HPOOL  ,MTAP4,DUMMY,IDMODE,IROW,NM)
      DO 630 J = 1,IROW
      CALL GETROW (MTAP4,1,BUFFER,NM)
      I1 = 1
      DO 9  I = 1,NM
      IF ( I .NE. IFLMD(I1) )      GO TO 9
      QZ(J,I1)  =  BUFFER(I)
      I1 = I1 + 1
    9 CONTINUE
  630 CONTINUE
      NC  =  IROW
      CALL GEDLAB (6HPOOL  ,MTAP4,DUMMY,IDMAS,IROW,NM)
      I2  =  1
      DO 690  J=1,IROW
      CALL GETROW (MTAP4,1,BUFFER,NM)
      IF (J.NE.IFLMD(I2)) GOTO 690
      I1 = 1
      DO 660 I=1,NM
      IF (I.NE.IFLMD(I1)) GOTO 660
      WW(I2,I1) = BUFFER(I)
      I1 = I1 + 1
  660 CONTINUE
      I2 = I2 + 1
  690 CONTINUE
      CALL GEDLAB (6HPOOL  ,MTAP4,DUMMY,IDOMG,IROW,NM)
      I2 = 1
      DO 680 J=1,IROW
      CALL GETROW (MTAP4,1,BUFFER,NM)
      IF (J.NE.IFLMD(I2)) GOTO 680
```

```
          SUBROUTINE POOL                                                  POOL       2
C         INPUT FUSELAGE POINTS LAST IN EACH MODE                          POOL       3
C                                                                          POOL       4
C                                                                          POOL       5
          DIMENSION BUFFER(40),IFLMD(40),QZ(220,40),WW(40,40),OMG(40)      POOL       6
          DIMENSION       DUMMY(2)                                         POOL       7
          DIMENSION ITAPES(50),IPOS(20),IFILES(50)                         POOL       8
          DIMENSION TSHF(1)             ,TITLE(18,2)                       POOL       9
C                                                                          POOL      10
          COMPLEX   B(40,40),DETAD(40,40),UMOD(40),VMOD(40)                POOL      11
C                                                                          POOL      12
          COMMON /MODD  / B, DETAD, WW, OMG, NC                            POOL      13
          COMMON /COMA  / LC(40), BR                                       POOL      14
          COMMON / CTAPES/ ITAPES                                          POOL      15
          COMMON / FILE / IPOS                                             POOL      16
          COMMON /CTITLE/ LTITLE,TITLE                                     POOL      17
          COMMON /CTSHF / LTSHF ,TSHF                                      POOL      18
          COMMON /CFILES/ KFILES,IFILES                                    POOL      19
          COMMON /CLIST / KOUNT ,KPAGE ,LINES ,LINEST,KLABEL,KTPAGE,NPAGE  POOL      20
         1               ,KBPAGE,LINESG,KOUNTH,KOUNTI                      POOL      21
          COMMON /CTABLE/ KTABLE,NPASS ,NROWS ,NCOLS ,NCOLST,KTABLO,NPAGEA POOL      22
         1               ,ITAPET                                           POOL      23
          COMMON /COMRWP/ ITAPER,ITAPEW,ITAPEP                             POOL      24
          COMMON /FLUT  / UMOD,VMOD,VF,WW1,CSCL,LC2,IFLMD                  POOL      25
C                                                                          POOL      26
C                                                                          POOL      27
C INITIAL CONDITIONS                                                       POOL      28
C                                                                          POOL      29
          MTAP4  =  ITAPES(24)                                             POOL      30
          MTAP49 =  ITAPES(49)                                             POOL      31
          LC2    =  LC(2)                                                  POOL      32
          ZERO   =  0.0                                                    POOL      33
          NMD = 40                                                         POOL      34
          NCD = 220                                                        POOL      35
          KOUNT  =  LINES                                                  POOL      36
          CALL DVALUE (WW     ,ZERO,NMD*NMD)                               POOL      37
          CALL DVALUE (QZ     ,ZERO,NCD*NMD)                               POOL      38
          CALL DVALUE (BUFFER,ZERO,NMD)                                    POOL      39
          CALL PROGNA (4H(POO, 4HL  ))                                     POOL      40
          CALL TITLES (2)                                                  POOL      41
          CALL PLB (1,1,ITAPEW)                                            POOL      42
          WRITE (ITAPEW,2000)                                              POOL      43
          CALL PLB (1,1,ITAPEW)                                            POOL      44
          KOUNT  =  KOUNT + 4                                              POOL      45
          NROWS  =  1                                                      POOL      46
          NCOLS  =  0                                                      POOL      47
          KTABLE =  2                                                      POOL      48
          CALL PTABLE (2,41,41HENTER VIBRATION DATA FOR FLUTTER ANALYSIS)  POOL      49
          KOUNT  =  KOUNT + 2                                              POOL      50
C                                                                          POOL      51
          READ (ITAPER,20) IN                                              POOL      52
C                                                                          POOL      53
          GO TO ( 300 , 610 , 500 ) , IN                                   POOL      54
C         IN = 1  MODAL DATA ON CARDS                                      POOL      55
C         IN = 2  MODAL DATA ON VIBRATION TAPE ------ CALLED BY FILE       POOL      56
C         IN = 3  MODAL DATA ON BINARY TAPE FROM VIBRATION DECK            POOL      57
C                                                                          POOL      58
```

```
EXTERNALS          TYPE   ARGS        REFERENCES
       DCMPLF    COMPLEX    2              3        32

STATEMENT LABELS              DEF LINE   REFERENCES
    0  310                        28         25
   36  320                        32         13

LOOPS  LABEL     INDEX      FROM-TO     LENGTH     PROPERTIES
   26  310       J            25 28         7B      INSTACK

STATISTICS
  PROGRAM LENGTH                   56B        46
          52000B CM USED
```

```
      CCDC  BEGINNING OF STATEMENTS ASSOCIATED WITH CDC COMPUTER PROGRAMS     COMSCA      2
            COMPLEX FUNCTION COMSCA (W,Z,SS,NN,IW,IZ)                          COMSCA      3
            COMPLEX DCMPLF                                                     COMSCA      4
      CCDC  ENDING OF STATEMENTS ASSOCIATED WITH CDC COMPUTER PROGRAMS        COMSCA      5
      C                                                                        COMSCA      6
      CIBM  BEGINNING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS     COMSCA      7
      C     COMPLEX FUNCTION COMSCA*16 (W,Z,SS,NN,IW,IZ)                       COMSCA      8
      C     DOUBLE PRECISION SS                                                COMSCA      9
      C     COMPLEX*16 DCMPLF                                                  COMSCA     10
      CIBM  ENDING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS        COMSCA     11
      C                                                                        COMSCA     12
            DIMENSION     W(2,IW,1) , Z(2,IZ,1), SS(2)                         COMSCA     13
            IF ( NN .LE. 0 )    GO TO 320                                      COMSCA     14
      C                                                                        COMSCA     15
      CIBM  BEGINNING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS     COMSCA     16
      C     DO 310  J = 1,NN                                                   COMSCA     17
      C     SS(1)   =  SS(1) + DBLE(W(1,1,J))*DBLE(Z(1,1,J))                   COMSCA     18
      C    1                 - DBLE(W(2,1,J))*DBLE(Z(2,1,J))                   COMSCA     19
      C 310 SS(2)   =  SS(2) + DBLE(W(1,1,J))*DBLE(Z(2,1,J))                   COMSCA     20
      C    1                 + DBLE(W(2,1,J))*DBLE(Z(1,1,J))                   COMSCA     21
      CIBM  ENDING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS        COMSCA     22
      C                                                                        COMSCA     23
      C                                                                        COMSCA     24
      CCDC  BEGINNING OF STATEMENTS ASSOCIATED WITH CDC COMPUTER PROGRAMS     COMSCA     25
            DO 310  J=1,NN                                                     COMSCA     26
            SS(1)   =   SS(1) + W(1,1,J) * Z(1,1,J)                            COMSCA     27
           1                  - W(2,1,J) * Z(2,1,J)                            COMSCA     28
        310 SS(2)   =   SS(2) + W(1,1,J) * Z(2,1,J)                            COMSCA     29
           1                  + W(2,1,J) * Z(1,1,J)                            COMSCA     30
      CCDC  ENDING OF STATEMENTS ASSOCIATED WITH CDC COMPUTER PROGRAMS        COMSCA     31
      C                                                                        COMSCA     32
        320 COMSCA  =  DCMPLF (SS(1),SS(2))                                    COMSCA     33
            RETURN                                                             COMSCA     34
            END                                                                COMSCA     35
```

SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS	DEF LINE	REFERENCES
5 COMSCA	2	33

VARIABLES	SN	TYPE		RELOCATION								
51	COMSCA	COMPLEX			DEFINED	32						
0	IW	INTEGER		F.P.	REFS	12	DEFINED	2				
0	IZ	INTEGER		F.P.	REFS	12	DEFINED	2				
53	J	INTEGER			REFS	4*26	4*28	DEFINED	25			
0	NN	INTEGER		F.P.	REFS	13	25	DEFINED	2			
0	SS	REAL	ARRAY	F.P.	REFS	12	26	28	2*32	DEFINED	2	26
					28							
0	W	REAL	ARRAY	F.P.	REFS	12	2*26	2*28	DEFINED	2		
0	Z	REAL	ARRAY	F.P.	REFS	12	2*26	2*28	DEFINED	2		

```
ENTRY POINTS      DEF LINE     REFERENCES
    4  DSCAPR         24          49

VARIABLES      SN  TYPE            RELOCATION
   31  DSCAPR      REAL                          DEFINED      47
    0  IX          INTEGER               F.P.      REFS       45   DEFINED       24
    0  IY          INTEGER               F.P.      REFS       46   DEFINED       24
   34  J         * INTEGER                       DEFINED      35
   32  JX          INTEGER                         REFS       38        45   DEFINED      33      45
   33  JY          INTEGER                         REFS       38        46   DEFINED      34      46
    0  N           INTEGER               F.P.      REFS       32        35   DEFINED      24
    0  S           REAL                  F.P.      REFS       38        47   DEFINED      24      38
    0  X           REAL        ARRAY     F.P.      REFS       26        38   DEFINED      24
    0  Y           REAL        ARRAY     F.P.      REFS       26        38   DEFINED      24

STATEMENT LABELS               DEF LINE   REFERENCES
    0  100          INACTIVE       33          32
    0  110                         46          35
   27  120                         47        2*32

LOOPS  LABEL     INDEX      FROM-TO     LENGTH    PROPERTIES
   21  110       J            35 46        4B      INSTACK

STATISTICS
  PROGRAM LENGTH                  40B       32
          52000B CM USED
```

```
      C45700, FUN. DSCAPR                                                     DSCAPR     2
      C                                                                       DSCAPR     3
      C*********************************************************************** DSCAPR     4
      C                                                                     * DSCAPR     5
      C***  FUNCTION   DSCAPR  ******************************************** DSCAPR     6
      C                                                                     * DSCAPR     7
      C***  OBJECTIVE  ************************************************** DSCAPR     8
      C     ---------                                                       * DSCAPR     9
      C     ACCUMULATES PRODUCTS OF ROW AND COLUMN ELEMENTS OF MATRICES.    * DSCAPR    10
      C                                                                     * DSCAPR    11
      C***  INPUT/OUTPUT  *********************************************** DSCAPR    12
      C     ------------                                                    * DSCAPR    13
      C                                                                     * DSCAPR    14
      C***  SUMMARY OF SYMBOLS  ***************************************** DSCAPR    15
      C     ------------------                                              * DSCAPR    16
      C                                                                     * DSCAPR    17
      C***  ERROR MESSAGES  ********************************************* DSCAPR    18
      C     --------------                                                  * DSCAPR    19
      C     NONE.                                                           * DSCAPR    20
      C                                                                     * DSCAPR    21
      C*********************************************************************** DSCAPR    22
      C                                                                       DSCAPR    23
      C                                                                       DSCAPR    24
            FUNCTION DSCAPR(X,Y,S,N,IX,IY)                                    DSCAPR    25
      C                                                                       DSCAPR    26
            DIMENSION X(1),Y(1)                                               DSCAPR    27
      C                                                                       DSCAPR    28
      CIBM  BEGINNING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS     DSCAPR    29
      C     DOUBLE PRECISION S,DSCAPR                                         DSCAPR    30
      CIBM  ENDING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS        DSCAPR    31
      C                                                                       DSCAPR    32
            IF (N) 120,120,100                                                DSCAPR    33
        100 JX = 1                                                            DSCAPR    34
            JY = 1                                                            DSCAPR    35
            DO 110  J = 1,N                                                   DSCAPR    36
      C                                                                       DSCAPR    37
      CCDC  BEGINNING OF STATEMENTS ASSOCIATED WITH CDC COMPUTER PROGRAMS     DSCAPR    38
            S = S + X(JX)*Y(JY)                                               DSCAPR    39
      CCDC  ENDING OF STATEMENTS ASSOCIATED WITH CDC COMPUTER PROGRAMS        DSCAPR    40
      C                                                                       DSCAPR    41
      CIBM  BEGINNING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS     DSCAPR    42
      C     S = S + DBLE(X(JX)) * DBLE(Y(JY))                                 DSCAPR    43
      CIBM  ENDING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS        DSCAPR    44
      C                                                                       DSCAPR    45
            JX = JX + IX                                                      DSCAPR    46
        110 JY = JY + IY                                                      DSCAPR    47
        120 DSCAPR = S                                                        DSCAPR    48
      C                                                                       DSCAPR    49
            RETURN                                                            DSCAPR    50
            END                                                               DSCAPR    51
```

SYMBOLIC REFERENCE MAP (R=3)

```
                  SUBROUTINE CNRW (IU, A, MID)                                    CNRW       2
            C                                                                     CNRW       3
                  COMPLEX           A(MID)                                        CNRW       4
            C                                                                     CNRW       5
                  IF (IU .LT. 0)   GO TO 10                                       CNRW       6
                  WRITE (IU) A                                                    CNRW       7
                  RETURN                                                          CNRW       8
               10 IB = IABS (IU)                                                  CNRW       9
                  READ (IB)  A                                                    CNRW      10
                  RETURN                                                          CNRW      11
                  END                                                             CNRW      12
```

```
       SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS      DEF LINE      REFERENCES
    3  CNRW            1           7         10

VARIABLES      SN  TYPE           RELOCATION
    O  A          COMPLEX    ARRAY      F.P.        REFS         3          6   DEFINED        1         9
   34  IB         INTEGER                        DEFINED         8    I/O REFS        9
    O  IU         INTEGER               F.P.        REFS         5          8   DEFINED        1    I/O REFS       6
    O  MID        INTEGER               F.P.        REFS         3    DEFINED         1
       VARIABLES USED AS FILE NAMES, SEE ABOVE

INLINE FUNCTIONS   TYPE    ARGS        DEF LINE  REFERENCES
       IABS       INTEGER    1  INTRIN                 8

STATEMENT LABELS              DEF LINE   REFERENCES
   15  10                          8          5

STATISTICS
  PROGRAM LENGTH                   35B        29
          52000B CM USED
```

```
    1              SUBROUTINE RNRW (IU, A, MID)                                 RNRW        2
             C                                                                  RNRW        3
                   DIMENSION        A(MID)                                      RNRW        4
             C                                                                  RNRW        5
    5              IF (IU .LT. 0)   GO TO 10                                    RNRW        6
                   WRITE (IU) A                                                 RNRW        7
                   RETURN                                                       RNRW        8
                10 IB  =  IABS(IU)                                              RNRW        9
                   READ (IB) A                                                  RNRW       10
   10              RETURN                                                       RNRW       11
                   END                                                          RNRW       12
```

```
        SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS      DEF LINE      REFERENCES
    3  RNRW             1            7         10

VARIABLES      SN  TYPE            RELOCATION
    O  A           REAL        ARRAY     F.P.        REFS        3         6   DEFINED       1       9
   34  IB          INTEGER                        DEFINED        8    I/O REFS       9
    O  IU          INTEGER               F.P.        REFS        5         8   DEFINED       1    I/O REFS      6
    O  MID         INTEGER               F.P.        REFS        3    DEFINED        1
       VARIABLES USED AS FILE NAMES, SEE ABOVE

INLINE FUNCTIONS    TYPE    ARGS        DEF LINE   REFERENCES
       IABS        INTEGER     1  INTRIN                 8

STATEMENT LABELS               DEF LINE    REFERENCES
   15  10                           8           5

STATISTICS
  PROGRAM LENGTH                   35B        29
         52000B CM USED
```

```
COMMON BLOCKS   LENGTH     MEMBERS - BIAS NAME(LENGTH)
                                     6 NPAGE  (1)          7 KBPAGE (1)          8 LINESG (1)
                                     9 KOUNTH (1)         10 KOUNTI (1)
      CTABLE         8               0 KTABLE (1)          1 NPASS  (1)          2 NROWS  (1)
                                     3 NCOLS  (1)          4 NCOLST (1)          5 KTABLO (1)
                                     6 NPAGEA (1)          7 ITAPET (1)
      CAFFDL         4               0 AFFDL  (4)

STATISTICS
  PROGRAM LENGTH                 1104B      580
  CM LABELED COMMON LENGTH         32B       26
         52000B CM USED
```

```
ENTRY POINTS     DEF LINE     REFERENCES
    1  TAFAM           15       333

VARIABLES     SN  TYPE            RELOCATION
    0  AFFDL      REAL       ARRAY   CAFFDL       REFS         17        24        58
    2  ITAPEP     INTEGER            COMRWP       REFS         19
    0  ITAPER     INTEGER            COMRWP       REFS         19
    7  ITAPET     INTEGER            CTABLE       REFS         22
    1  ITAPEW     INTEGER            COMRWP       REFS         19     I/O REFS     54        55        56        57        58
                                                    59         60        61        62        63        64        65        66
                                                    67         68        69
    7  KBPAGE     INTEGER            CLIST        REFS         20
    4  KLABEL     INTEGER            CLIST        REFS         20
    0  KOUNT      INTEGER            CLIST        REFS         20     DEFINED      29        49
   11  KOUNTH     INTEGER            CLIST        REFS         20
   12  KOUNTI     INTEGER            CLIST        REFS         20
    1  KPAGE      INTEGER            CLIST        REFS         20
    0  KTABLE     INTEGER            CTABLE       REFS         22     DEFINED      33        37        40        43        46
    5  KTABLO     INTEGER            CTABLE       REFS         22
    5  KTPAGE     INTEGER            CLIST        REFS         20
    2  LINES      INTEGER            CLIST        REFS         20        29        49
   10  LINESG     INTEGER            CLIST        REFS         20
    3  LINEST     INTEGER            CLIST        REFS         20
    3  NCOLS      INTEGER            CTABLE       REFS         22     DEFINED      31
    4  NCOLST     INTEGER            CTABLE       REFS         22
    6  NPAGE      INTEGER            CLIST        REFS         20
    6  NPAGEA     INTEGER            CTABLE       REFS         22
    1  NPASS      INTEGER            CTABLE       REFS         22
    2  NROWS      INTEGER            CTABLE       REFS         22     DEFINED      32        36
       VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS          TYPE   ARGS         REFERENCES
       PTABLE               3              34         38         41        44        47
       TITLES               1              30

STATEMENT LABELS             DEF LINE   REFERENCES
  201   100      FMT              70         54
  251   105      FMT              88         55
  317   110      FMT             104         56
  354   115      FMT             120         57
  411   120      FMT             136         58
  445   125      FMT             152         59
  475   130      FMT             168         60
  516   135      FMT             184         61
  537   140      FMT             200         62
  560   145      FMT             216         63
  601   150      FMT             235         64
  627   155      FMT             254         65
  666   160      FMT             273         66
  726   165      FMT             292         67
  766   170      FMT             311         68
 1032   175      FMT             331         69

COMMON BLOCKS    LENGTH      MEMBERS - BIAS NAME(LENGTH)
       COMRWP         3               0 ITAPER (1)              1 ITAPEW (1)              2 ITAPEP (1)
       CLIST         11               0 KOUNT  (1)              1 KPAGE  (1)              2 LINES  (1)
                                      3 LINEST (1)              4 KLABEL (1)              5 KTPAGE (1)
```

```
              *,/, 5X,1H*,2X                                                    TAFAM    287
              *,5X,   15H.   GRUMMAN    .,4X                                    TAFAM    288
              *,          40H  GGGGGGGGGGGGGG                      ,1X          TAFAM    289
              *,26X                                                             TAFAM    290
              M,13HMMM  MMM  MMM                                                TAFAM    291
              *,14X,1H*)                                                        TAFAM    292
          165 FORMAT (                                                          TAFAM    293
              *     5X,1H*,2X                                                   TAFAM    294
              *,5X,   15H.  AEROSPACE  .,4X                                     TAFAM    295
              *,          40H  GGGGGGGGGGGG                        ,1X          TAFAM    296
              *,26X                                                             TAFAM    297
              M,13HMMM  MMM  MMM                                                TAFAM    298
              *,14X,1H*                                                         TAFAM    299
              *,/, 5X,1H*,2X                                                    TAFAM    300
              *,5X,   15H. CORPORATION .,4X                                     TAFAM    301
              *,          40H  GGGGGGGGGG                          ,1X          TAFAM    302
              *,26X                                                             TAFAM    303
              M,13HMMM  MMM  MMM                                                TAFAM    304
              *,14X,1H*                                                         TAFAM    305
              *,/, 5X,1H*,2X                                                    TAFAM    306
              *,5X,   15H.             .,4X                                     TAFAM    307
              *,          40H  GGGGGGGG                            ,1X          TAFAM    308
              *,26X                                                             TAFAM    309
              M,13HMMM  MMM  MMM                                                TAFAM    310
              *,14X,1H*)                                                        TAFAM    311
          170 FORMAT (  5X, 1H*, 2X                                             TAFAM    312
              *,5X,   15H...............,4X                                     TAFAM    313
              *,          40H  GGGGGG                              ,1X          TAFAM    314
              *,26X                                                             TAFAM    315
              M,13HMMM  MMM  MMM                                                TAFAM    316
              *,14X,1H*                                                         TAFAM    317
              *,/, 5X,1H*,2X                                                    TAFAM    318
              *,24X,      40H  GGGG                                ,1X          TAFAM    319
              *,26X                                                             TAFAM    320
              M,13HMMM  MMM  MMM                                                TAFAM    321
              *,14X,1H*                                                         TAFAM    322
              *,/, 5X,1H*,2X                                                    TAFAM    323
              *,24X,      40H  GG                                  ,1X          TAFAM    324
              *,26X                                                             TAFAM    325
              M,13HMMM  MMM  MMM                                                TAFAM    326
              *,14X,1H*                                                         TAFAM    327
              *,/, 5X,1H*,2X                                                    TAFAM    328
              *,24X,      40H  G                                   ,1X          TAFAM    329
              *,26X                                                             TAFAM    330
              M,13HMMM  MMM  MMM      ,14X,1H*)                                 TAFAM    331
          175 FORMAT ( 5X,1H*,120X,1H*,/,5X,122(1H*))                           TAFAM    332
        C                                                                       TAFAM    333
              RETURN                                                            TAFAM    334
              END                                                               TAFAM    335
```

SYMBOLIC REFERENCE MAP (R=3)

```
      *,/, 5X,1H*,2X                                                    TAFAM     230
      *,65X                                                             TAFAM     231
      A,13H  AAA    AAA                                                 TAFAM     232
      *,13X                                                             TAFAM     233
      M,13HMMMM      MMMM                                               TAFAM     234
      *,14X, 1H*)                                                       TAFAM     235
  150 FORMAT (                                                          TAFAM     236
      *     5X,1H*,2X                                                   TAFAM     237
      *,65X                                                             TAFAM     238
      A,13H AAA      AAA                                                TAFAM     239
      *,13X                                                             TAFAM     240
      M,13HMMMMMM   MMMMM                                               TAFAM     241
      *,14X,1H*                                                         TAFAM     242
      *,/, 5X,1H*,2X                                                    TAFAM     243
      *,65X                                                             TAFAM     244
      A,13H AAA      AAA                                                TAFAM     245
      *,13X                                                             TAFAM     246
      M,13HMMMMMM   MMMMM                                               TAFAM     247
      *,14X,1H*                                                         TAFAM     248
      *,/, 5X,1H*,2X                                                    TAFAM     249
      *,8(3HGGG), 40HGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGG,1X        TAFAM     250
      A,13H AAA      AAA                                                TAFAM     251
      *,13X                                                             TAFAM     252
      M,13HMMMMMM   MMMMM                                               TAFAM     253
      *,14X,1H*)                                                        TAFAM     254
  155 FORMAT (                                                          TAFAM     255
      *     5X,1H*,2X                                                   TAFAM     256
      *,8(3HGGG), 40HGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGG      ,1X        TAFAM     257
      A,13HAAA        AAA                                               TAFAM     258
      *,13X                                                             TAFAM     259
      M,13HMMMMMMM MMMMMM                                               TAFAM     260
      *,14X,1H*                                                         TAFAM     261
      *,/, 5X,1H*,2X                                                    TAFAM     262
      *,24X,       40H  GGGGGGGGGGGGGGGGGGGGGGGGGGG           ,1X        TAFAM     263
      A,13HAAA        AAA                                               TAFAM     264
      *,13X                                                             TAFAM     265
      M,13HMMM MM MM MMM                                                TAFAM     266
      *,14X,1H*                                                         TAFAM     267
      *,/, 5X,1H*,2X                                                    TAFAM     268
      *,24X,       40H   GGGGGGGGGGGGGGGGGGGGGG               ,1X        TAFAM     269
      A,13HAAA        AAA                                               TAFAM     270
      *,13X                                                             TAFAM     271
      M,13HMMM MM MM MMM                                                TAFAM     272
      *,14X,1H*)                                                        TAFAM     273
  160 FORMAT (                                                          TAFAM     274
      *     5X,1H*,2X                                                   TAFAM     275
      *,5X,  15H...............,4X                                      TAFAM     276
      *,           40H    GGGGGGGGGGGGGGGG                    ,1X        TAFAM     277
      *,26X                                                             TAFAM     278
      M,13HMMM MMMMM MMM                                                TAFAM     279
      *,14X,1H*                                                         TAFAM     280
      *,/, 5X,1H*,2X                                                    TAFAM     281
      *,5X,  15H.              .,4X                                     TAFAM     282
      *,           40H   GGGGGGGGGGGGGGG                      ,1X        TAFAM     283
      *,26X                                                             TAFAM     284
      M,13HMMM MMMMM MMM                                                TAFAM     285
```

```
VARIABLES      SN  TYPE           RELOCATION
  750  IDVIBA      INTEGER                       REFS       127      129      155    I/O REFS    128
    1  IFILES      INTEGER    ARRAY    CFILES    REFS         7       18
  244  IFLMD       INTEGER    ARRAY    FLUT      REFS         5       24       91      101      104      114      134
                                                  141       144      153   DEFINED      85      126
  754  II          INTEGER                       REFS       140   DEFINED     140
  725  IN          INTEGER                       REFS        53   DEFINED      51
    0  IPOS        INTEGER    ARRAY    FILE      REFS         7       15
  745  IROW        INTEGER                       REFS        86       87       96       97       99      110      112
    2  ITAPEP      INTEGER             COMRWP    REFS        23
    0  ITAPER      INTEGER             COMRWP    REFS        23   I/O REFS     51       61       63       64       66
                                                   71        84       85      126
    0  ITAPES      INTEGER    ARRAY    CTAPES    REFS         7       14       29       30
    7  ITAPET      INTEGER             CTABLE    REFS        21
    1  ITAPEW      INTEGER             COMRWP    REFS        23       41       43       72      118      156
                                               I/O REFS      42       73      119      157
  731  I1          INTEGER                       REFS      2*67       91       92       93      104      105      106
                                                  134       135      136      144      145      146      152    2*153
                                               DEFINED       66       89       93      102      106      132      136
                                                  142       146      150      153
  734  I2          INTEGER                       REFS      2*68      101      105      108      114      115      116
                                                  141       145      148   DEFINED      66       98      108      111
                                                  116       138      148
  737  I3          INTEGER                       REFS      2*69   DEFINED      66
  747  J           INTEGER                       REFS        92      101      114      115      141      172
                                               DEFINED       87       99      112      139      170
  751  JDVIBA      INTEGER                       REFS       127      155
  732  J1          INTEGER                       REFS      2*67   DEFINED      66
  735  J2          INTEGER                       REFS      2*68   DEFINED      65
  740  J3          INTEGER                       REFS      2*69   DEFINED      66
  727  K           INTEGER                       REFS        63   DEFINED      63
    7  KBPAGE      INTEGER             CLIST     REFS        19
  752  KDVIBA   *  INTEGER                       REFS       127
    0  KFILES      INTEGER             CFILES    REFS        18
    4  KLABEL      INTEGER             CLIST     REFS        19
    0  KOUNT       INTEGER             CLIST     REFS        19       44       49   DEFINED      35       44       49
   11  KOUNTH      INTEGER             CLIST     REFS        19
   12  KOUNTI      INTEGER             CLIST     REFS        19
    1  KPAGE       INTEGER             CLIST     REFS        19
    0  KTABLE      INTEGER             CTABLE    REFS        21   DEFINED      47
    5  KTABLO      INTEGER             CTABLE    REFS        21
    5  KTPAGE      INTEGER             CLIST     REFS        19
    0  LC          INTEGER    ARRAY    COMA      REFS        13       31
  243  LC2         INTEGER             FLUT      REFS        24       62       71       85      126      168      171
                                                  173   DEFINED       31
    2  LINES       INTEGER             CLIST     REFS        19       35
   10  LINESG      INTEGER             CLIST     REFS        19
    3  LINEST      INTEGER             CLIST     REFS        19
  753  LOCFIL   *  INTEGER                       REFS       127
    0  LTITLE      INTEGER             CTITLE    REFS        16
    0  LTSHF       INTEGER             CTSHF     REFS        17
  720  MTAP4       INTEGER                       REFS        86       88       97      100      110      113      152
                                               DEFINED       29      129   I/O REFS     130      131      140
  721  MTAP49      INTEGER                       REFS       169      173   DEFINED      30   I/O REFS    167      174
17550  NC          INTEGER             MODD      REFS        12       63      152      169      170
                                               DEFINED       61       96      130
  730  NCARD       INTEGER                       REFS        65   DEFINED      64
```

```
VARIABLES      SN  TYPE              RELOCATION
     3  NCOLS      INTEGER                CTABLE       REFS          21   DEFINED       46
     4  NCOLST     INTEGER                CTABLE       REFS          21
   746  NM         INTEGER                             REFS          86        88        90        97       100       103       110
                                                        113         131       133       139       140       143       151
                                                    DEFINED         130
   723  NMD        INTEGER                             REFS        2*36        37        38   DEFINED        33
     6  NPAGE      INTEGER                CLIST        REFS          19
     6  NPAGEA     INTEGER                CTABLE       REFS          21
     1  NPASS      INTEGER                CTABLE       REFS          21
     2  NROWS      INTEGER                CTABLE       REFS          21   DEFINED       45
 17500  OMG        REAL         ARRAY     MODD         REFS           5        12   DEFINED        71       115       135
  1025  QZ         REAL         ARRAY                  REFS           5        37       152       169       172
                                                    DEFINED          63        92
     1  TITLE      REAL         ARRAY     CTITLE       REFS           8        16
     1  TSHF       REAL         ARRAY     CTSHF        REFS           8        17
     0  UMOD       COMPLEX      ARRAY     FLUT         REFS          10        24
   733  VALU1      REAL                                REFS          67   DEFINED       66
   736  VALU2      REAL                                REFS          68   DEFINED       66
   741  VALU3      REAL                                REFS          69   DEFINED       66
   240  VF         REAL                   FLUT         REFS          24
   120  VMOD       COMPLEX      ARRAY     FLUT         REFS          10        24
 14400  WW         REAL         ARRAY     MODD         REFS           5        12        36   DEFINED        67        68        69
                                                        105         145
   241  WW1        REAL                   FLUT         REFS          24
   722  ZERO       REAL                                REFS          36        37        38   DEFINED        32
        VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS            TYPE     ARGS         REFERENCES
        DVALUE                  3               36        37        38
        FCLOSE                  3              155
        FLINFO                  0              179
        FSIO                    6              127
        GEDLAB                  6               86        97       110
        GETROW                  4               88       100       113
        PLB                     3               41        43        72       118       156
        PROGNA                  2               39
        PTABLE                  3               48
        RNRW                    3              152       169       173
        TITLES                  1               40

STATEMENT LABELS               DEF LINE    REFERENCES
   303  3                         137         133       134
   335  5                         149         139       141
   331  6                         147         143       144
     0  7                         154         151
   171  9                          94          90        91
   651  20         FMT            184          51        61        64        84        85       126
     0  25                         70          65
   653  40         FMT            185          63        71
     0  60                         63          62
    57  300                        61          53
   252  500                       125          53
   362  600                       166          74       120
   142  610                        79          53
     0  630                        95          87
     0  655                       169         168
   222  660                       107         103       104
```

```
STATEMENT LABELS                DEF LINE   REFERENCES
    0  675                        172        171
  243  680                        117        112        114
    0  685                        173        170
  226  690                        109         99        101
  655  710      FMT               186         66
  660  1000     FMT               187         73
  666  1100     FMT               188        119
  676  1200     FMT               190        157
  706  2000     FMT               192         42

LOOPS  LABEL    INDEX     FROM-TO     LENGTH     PROPERTIES
   62  60       I          62 63        12B                 EXT REFS
   76  25       I          65 70        32B                 EXT REFS
  154  630      J          87 95        22B                 EXT REFS  NOT INNER
  165  9        I          90 94         5B       INSTACK
  203  690      J          99 109       26B                 EXT REFS  NOT INNER
  216  660      I         103 107        5B       INSTACK
  234  680      J         112 117       12B                 EXT REFS
  300  3        I         133 137        4B       INSTACK
  307  5        J         139 149       31B                 EXT REFS  NOT INNER
  325  6        I         143 147        5B       INSTACK
  341  7        I         151 154       14B                 EXT REFS
  365  655      I         168 169        7B                 EXT REFS
  375  685      J         170 173       15B                 EXT REFS  NOT INNER
  402  675      I         171 172        3B       INSTACK

COMMON BLOCKS   LENGTH     MEMBERS - BIAS NAME(LENGTH)
       MODD       8041                0 B       (3200)        3200 DETAD  (3200)         6400 WW      (1600)
                                   8000 OMG     (40)          8040 NC     (1)
       COMA         41                0 LC      (40)            40 BR     (1)
       CTAPES       50                0 ITAPES  (50)
       FILE         20                0 IPOS    (20)
       CTITLE       37                0 LTITLE  (1)              1 TITLE  (36)
       CTSHF         2                0 LTSHF   (1)              1 TSHF   (1)
       CFILES       51                0 KFILES  (1)              1 IFILES (50)
       CLIST        11                0 KOUNT   (1)              1 KPAGE  (1)              2 LINES  (1)
                                      3 LINEST  (1)              4 KLABEL (1)              5 KTPAGE (1)
                                      6 NPAGE   (1)              7 KBPAGE (1)              8 LINESG (1)
                                      9 KOUNTH  (1)             10 KOUNTI (1)
       CTABLE        8                0 KTABLE  (1)              1 NPASS  (1)              2 NROWS  (1)
                                      3 NCOLS   (1)              4 NCOLST (1)              5 KTABLC (1)
                                      6 NPAGEA  (1)              7 ITAPET (1)
       COMRWP        3                0 ITAPER  (1)              1 ITAPEW (1)              2 ITAPEP (1)
       FLUT        204                0 UMOD    (80)            80 VMOD   (80)           160 VF     (1)
                                    161 WW1     (1)            162 CSCL   (1)            163 LC2    (1)
                                    164 IFLMD   (40)

STATISTICS
  PROGRAM LENGTH                22211B     9353
  CM LABELED COMMON LENGTH      20424B     8468
          52000B CM USED
```

```
      SUBROUTINE FLINFO                                                FLINFO   2
C                                                                      FLINFO   3
      COMPLEX   B(40,40),DETAD(40,40)                                  FLINFO   4
      COMPLEX   DELB                                                   FLINFO   5
C                                                                      FLINFO   6
      DIMENSION ITAPES(50)                                             FLINFO   7
      DIMENSION OMGC(40),OMGR(40),NQA(40),GDP(40),WW(40,40)            FLINFO   8
      DIMENSION NOTI(25),NINZ(40,25),RATOM(20),QMWT(40,5),QWT(5)       FLINFO   9
      DIMENSION         LC(40)                                         FLINFO  10
      DIMENSION RVBO(15), VBO(30), RHOR(10)                            FLINFO  11
      DIMENSION           V(25) ,    TITLE1(18) ,    TITLE2(18)        FLINFO  12
      DIMENSION TSHF(1)                                                FLINFO  13
      DIMENSION DELK(3,3),DELOM(3,3), OMRBSQ(3)                        FLINFO  14
C                                                                      FLINFO  15
      COMMON /CTAPES/ ITAPES                                           FLINFO  16
      COMMON /COMA/ LC , BR                                            FLINFO  17
      COMMON /MODD  / B      ,DETAD ,WW    ,OMGR  ,NC                  FLINFO  18
      COMMON /FLUTAN/ FMACH ,BETA  ,VBO   ,RVBO  ,NRVBO                FLINFO  19
      COMMON /FLUTB/ V,NV,DV                                           FLINFO  20
      COMMON /FLUTC/ RHOR,NOTI,NINZ,RATOM                              FLINFO  21
      COMMON /FLUTV/ VA,VB,FLO,FHI,IE,NQZ,NVTOT                        FLINFO  22
      COMMON /FLUTQ/ QMWT,QWT                                          FLINFO  23
      COMMON /CALCP/ TITLE1,TITLE2,DUB,FUB,VUB,DLB,FLB,VLB,IPLOT,LSD,  FLINFO  24
     1         DSCALE,FSCALE,VSCALE,DPLEN,FRLEN,VLEN,XDT               FLINFO  25
      COMMON /PRPL/ GMAX,GMIN,FRMAX,FRMIN,VMAX,VMIN                    FLINFO  26
      COMMON /CLIST / KOUNT ,KPAGE ,LINES ,LINEST,KLABEL,KTPAGE,NPAGE  FLINFO  27
     1              ,KBPAGE,LINESG,KOUNTH,KOUNTI                       FLINFO  28
      COMMON /CTABLE/ KTABLE,NPASS ,NROWS ,NCOLS ,NCOLST,KTABLO,NPAGEA FLINFO  29
     1              ,ITAPET                                            FLINFO  30
      COMMON /COMRWP/ ITAPER,ITAPEW,ITAPEP                             FLINFO  31
      COMMON /REPORT/ KREPOR                                           FLINFO  32
      COMMON /CHEAD / KHEAD,KRETUR,KOLUMN,IR,JCL,JCU,LSUB,LSKIP        FLINFO  33
      COMMON /CTSHF / LTSHF, TSHF                                      FLINFO  34
      COMMON /QELIM / QDW, VQDW, LC38                                  FLINFO  35
C                                                                      FLINFO  36
      EQUIVALENCE(OMGC(1), OMGR(1))                                    FLINFO  37
C                                                                      FLINFO  38
      LC38 = LC(38)                                                    FLINFO  39
      MTAP1=ITAPES(37)                                                 FLINFO  40
      ZERO   =  0.0                                                    FLINFO  41
      ONE    =  1.0                                                    FLINFO  42
      NQED   =  5                                                      FLINFO  43
      NMD = 40                                                         FLINFO  44
      CALL DVALUE (GDP    ,ZERO,NMD)                                   FLINFO  45
      CALL DVALUE (QWT    ,ONE ,NQED)                                  FLINFO  46
      CALL DVALUE (QMWT   ,ONE ,NMD*NQED)                              FLINFO  47
      TWOPI  =  6.283184                                               FLINFO  48
      KOLUMN =  8                                                      FLINFO  49
      IF (KREPOR .EQ. 2) KOLUMN = 4                                    FLINFO  50
      CALL PROGNA (4H(FLI, 4HNFO))                                     FLINFO  51
C                                                                      FLINFO  52
      READ (ITAPER,1)  BR , FMACH                                      FLINFO  53
      BR  =  BR / 12.0                                                 FLINFO  54
      NM     =  LC(2)                                                  FLINFO  55
      ARG    =  ABS(FMACH*FMACH - 1.0)                                 FLINFO  56
      BETA   =  SQRT(ARG)                                              FLINFO  57
C                                                                      FLINFO  58
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      IF(LC(1).EQ.1) LC(33)=0                                     FLINFO   59
      IF(LC(1).EQ.-1) LC(33)=0                                    FLINFO   60
      IF (LC(1) .EQ. 2)  LC(13) = 0                               FLINFO   61
      IF (LC(1) .EQ. 2) LC(33)=1                                  FLINFO   62
      IF (LC(1) .EQ. 2) GO TO 21                                  FLINFO   63
      IF(LC(33).EQ.1) GO TO 73                                    FLINFO   64
      IF (LC(1) .EQ.-1) GO TO 29                                  FLINFO   65
C                                                                 FLINFO   66
C REDUCED VELOCITIES                                              FLINFO   67
C                                                                 FLINFO   68
  300 NVBO= LC(4)                                                 FLINFO   69
      READ(ITAPER,1) (VBO(I), I= 1,NVBO)                          FLINFO   70
      IF(LC(1).EQ.0) GO TO 73                                     FLINFO   71
      IF (LC(13).EQ. 1) GO TO 10                                  FLINFO   72
      GO TO 11                                                    FLINFO   73
C                                                                 FLINFO   74
C PK DATA                                                         FLINFO   75
C                                                                 FLINFO   76
   29 LC(13)= 1                                                   FLINFO   77
      READ(ITAPER,49) NV, V1, DV                                  FLINFO   78
      V(1) = V1                                                   FLINFO   79
      DO 51 I= 2,NV                                               FLINFO   80
   51 V(I)= V(I-1) + DV                                           FLINFO   81
C                                                                 FLINFO   82
C REFERENCE REDUCED VELOCITIES                                    FLINFO   83
C                                                                 FLINFO   84
   10 READ (ITAPER,9) NRVBO                                       FLINFO   85
      READ (ITAPER,1) (RVBO(I` I=1,NRVBO)                         FLINFO   86
      IF ((LINES-KOUNT) .LT. 4) KOUNT = LINES                     FLINFO   87
      CALL TITLES (3)                                             FLINFO   88
      CALL PLB (1,1,ITAPEW)                                       FLINFO   89
      KOUNT  =  KOUNT + 4                                         FLINFO   90
      WRITE (ITAPEW,4000)                                         FLINFO   91
      CALL PLB (1,1,ITAPEW)                                       FLINFO   92
      KOUNT  =  KOUNT + 4                                         FLINFO   93
      WRITE (ITAPEW,43) (RVBO(I),I=1,NRVBO)                       FLINFO   94
      NROWS  = 1                                                  FLINFO   95
      NCOLS  = 0                                                  FLINFO   96
      KTABLE = 2                                                  FLINFO   97
      CALL PTABLE (2,58,58                                        FLINFO   98
     1   HREDUCED VELOCITIES FOR INTERPOLATION OF GENERALIZED FORCES)   FLINFO   99
C                                                                 FLINFO  100
C READ FROM CARDS CHANGES FOR THE GENERALIZED MASS AND FREQUENCIES   FLINFO  101
C                                                                 FLINFO  102
   11 IF (LC(31) .EQ. 0) GO TO 7                                  FLINFO  103
      READ (ITAPER,50)   MADD , IADO , MSYM                       FLINFO  104
      IF (MADD .EQ. 0)   GO TO 3                                  FLINFO  105
      DO 4  II = 1,MADD                                           FLINFO  106
    4 READ (ITAPER,5)  I,J,WW(I,J)                                FLINFO  107
      IF  (MSYM .EQ. 1) GOTO 3                                    FLINFO  108
      DO 6  I = 1,NM                                              FLINFO  109
      DO 6  J = 1,NM                                              FLINFO  110
      IF ( J .GE. I )    GO TO 6                                  FLINFO  111
      WW(I,J)  =  WW(J,I)                                         FLINFO  112
    6 CONTINUE                                                    FLINFO  113
    3 IF ( IADO .EQ. 0 ) GO TO 7                                  FLINFO  114
      DO 8  I = 1,IADO                                            FLINFO  115
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    8 READ (ITAPER,9) II,  OMGC(II)                                  FLINFO  116
    7 CONTINUE                                                       FLINFO  117
C                                                                    FLINFO  118
C READ STRUCTURAL DAMPING AND CALCULATE UPPER TRIANGLE OF COMPLEX    FLINFO  119
C STIFFNESS MATRIX (SPRING TERMS)                                    FLINFO  120
C                                                                    FLINFO  121
      IF ( LC(16) .EQ. 0 )    GO TO 21                               FLINFO  122
      IF ( LC(16) .LT. 0 )    GO TO 22                               FLINFO  123
      READ (ITAPER,1)    GDD                                         FLINFO  124
      DO 23  I = 1,NM                                                FLINFO  125
   23 GDP(I)   =  GDD                                                FLINFO  126
      GO TO 24                                                       FLINFO  127
   22 READ (ITAPER,50)  NCD                                          FLINFO  128
      DO 25  I = 1,NCD                                               FLINFO  129
   25 READ (ITAPER,9) I1, GDP(I1)                                    FLINFO  130
   24 CONTINUE                                                       FLINFO  131
   21 IF (LC(1).EQ.-1) GOTO 28                                       FLINFO  132
      IREF     =  LC(11)                                             FLINFO  133
      OMGR2  =  (OMGC(IREF)*TWOPI)**2                                FLINFO  134
      OREF   =  1.0/OMGR2                                            FLINFO  135
   28 DO 31  I=1,NM                                                  FLINFO  136
      DO 31  J = 1,NM                                                FLINFO  137
      B(I,J)   =  CMPLX (0.0,0.0)                                    FLINFO  138
      IF ( I .NE. J )    GO TO 31                                    FLINFO  139
      OMGR2  =  (OMGC(I)*TWOPI)**2                                   FLINFO  140
      BB     =  WW(I,J)*OMGR2                                        FLINFO  141
      IF (LC(1) .NE. -1 )      BB = BB * OREF                        FLINFO  142
      BD       =  BB * GDP(I)                                        FLINFO  143
      B(I,J)   =  CMPLX ( BB , BD )                                  FLINFO  144
   31 CONTINUE                                                       FLINFO  145
C                                                                    FLINFO  146
C IF BOTH RIGID-BODY TRANSLATION MODES AND RIGID-BODY ROTATION MODES FLINFO  147
C ARE INCLUDED IN FLUTTER ANALYSIS, AND IF AN ARTIFICIAL NONZERO     FLINFO  148
C FREQUENCY HAS BEEN SPECIFIED FOR A RIGID-BODY TRANSLATION MODE,    FLINFO  149
C CALCULATE INCREMENTAL RIGID-BODY GENERALIZED STIFFNESS TERMS.      FLINFO  150
C RESULTS ARE DEVELOPED FROM OFF-DIAGONAL GENERALIZED-MASS TERMS,    FLINFO  151
C AND WILL BE ZERO IF PLUG LOCATION AT WHICH RIGID-BODY MODES        FLINFO  152
C ARE SPECIFIED IS COINCIDENT WITH AIRPLANE CG.                      FLINFO  153
C                                                                    FLINFO  154
      READ (ITAPER,50) NRBTR, NRBTOT                                 FLINFO  155
      IF (NRBTR.EQ.0)  GO TO 115                                     FLINFO  156
      SUMOMG = 0.0                                                   FLINFO  157
      DO 87 I=1,NRBTR                                                FLINFO  158
      SUMOMG = SUMOMG + OMGC(I)                                      FLINFO  159
   87 CONTINUE                                                       FLINFO  160
      IF (SUMOMG.EQ.0.0)  GO TO 115                                  FLINFO  161
      NRBROT = NRBTOT - NRBTR                                        FLINFO  162
      IF (NRBROT.EQ.0)  GO TO 115                                    FLINFO  163
      NROT1 = NRBTR + 1                                              FLINFO  164
      TWPISQ = TWOPI*TWOPI                                           FLINFO  165
      DO 90 I=1,NRBTOT                                               FLINFO  166
      OMRBSQ(I) = OMGC(I)*OMGC(I)*TWPISQ                             FLINFO  167
      DO 89 J=1,NRBTOT                                               FLINFO  168
      DELK(I,J) = 0.0                                                FLINFO  169
      DELOM(I,J) = 0.0                                               FLINFO  170
   89 CONTINUE                                                       FLINFO  171
   90 CONTINUE                                                       FLINFO  172
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      DO 93 I=1,NRBTR                                                   FLINFO   173
      DO 92 J=NROT1,NRBTOT                                              FLINFO   174
      DELK(I,J) = WW(I,J)*OMRBSQ(I)                                     FLINFO   175
      DELK(J,I) = DELK(I,J)                                             FLINFO   176
   92 CONTINUE                                                          FLINFO   177
   93 CONTINUE                                                          FLINFO   178
      IF (NRBROT.NE.2)  GO TO 95                                        FLINFO   179
      DELK(2,3) = WW(2,3)*OMRBSQ(1)                                     FLINFO   180
      DELK(3,2) = DELK(2,3)                                             FLINFO   181
   95 CONTINUE                                                          FLINFO   182
      DO 96 J=NROT1,NRBTOT                                              FLINFO   183
      DELK(J,J) = 0.0                                                   FLINFO   184
   96 CONTINUE                                                          FLINFO   185
      DO 98 I=1,NRBTR                                                   FLINFO   186
      DO 97 J=NROT1,NRBTOT                                              FLINFO   187
      DELOM(I,J) = OMRBSQ(I) - OMRBSQ(J)                                FLINFO   188
      DELK(J,J) = DELK(J,J) + DELOM(I,J)*WW(I,J)*WW(I,J)/WW(I,I)        FLINFO   189
   97 CONTINUE                                                          FLINFO   190
   98 CONTINUE                                                          FLINFO   191
      DO 110 I=1,NRBTOT                                                 FLINFO   192
      DO 109 J=1,NRBTOT                                                 FLINFO   193
      IF (LC(1).NE.-1)  DELK(I,J) = DELK(I,J) * OREF                    FLINFO   194
      IF (I.NE.J)  GO TO 108                                            FLINFO   195
      DELD = DELK(I,J)*GDP(I)                                           FLINFO   196
      DELB = CMPLX(DELK(I,J),DELD)                                      FLINFO   197
      B(I,J) = B(I,J) + DELB                                            FLINFO   198
      GO TO 109                                                         FLINFO   199
  108 CONTINUE                                                          FLINFO   200
      B(I,J) = B(I,J) + DELK(I,J)                                       FLINFO   201
  109 CONTINUE                                                          FLINFO   202
  110 CONTINUE                                                          FLINFO   203
  115 CONTINUE                                                          FLINFO   204
      IF (LC(1) .EQ. 2) GO TO 42                                        FLINFO   205
C                                                                       FLINFO   206
C PREPARE INFORMATION FOR PLOTTING FLUTTER RESULTS                      FLINFO   207
C                                                                       FLINFO   208
C     PRINT PLOT SPECIFICATIONS                                         FLINFO   209
C                                                                       FLINFO   210
      VMIN     =  0.0                                                   FLINFO   211
      FRMIN    =  0.0                                                   FLINFO   212
      READ (ITAPER,1) GMAX,GMIN,VMAX,FRMAX                              FLINFO   213
      IF ( LC(14) .EQ. 0 )    GO TO 42                                  FLINFO   214
C                                                                       FLINFO   215
C     CALCOMP SPECIFICATIONS                                            FLINFO   216
C                                                                       FLINFO   217
C                                                                       FLINFO   218
C     READ TITLES                                                       FLINFO   219
C                                                                       FLINFO   220
CIBM  BEGINNING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS     FLINFO   221
C     LTITLE =  18                                                      FLINFO   222
CIBM  ENDING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS        FLINFO   223
CCDC  BEGINNING OF STATEMENTS ASSOCIATED WITH CDC COMPUTER PROGRAMS     FLINFO   224
      LTITLE =  8                                                       FLINFO   225
CCDC  ENDING OF STATEMENTS ASSOCIATED WITH CDC COMPUTER PROGRAMS        FLINFO   226
      READ (ITAPER,30) (TITLE1(I), I=1,LTITLE)                          FLINFO   227
      READ (ITAPER,30) (TITLE2(I), I=1,LTITLE)                          FLINFO   228
C                                                                       FLINFO   229
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C     READ TYPE PLOTS AND LIMITS OF PLOTTED VARIABLES                  FLINFO  230
C                                                                      FLINFO  231
      READ (ITAPER,55) LSD , DUB , FUB , VUB , DLB                     FLINFO  232
      FLB= 0.0                                                         FLINFO  233
      VLB= 0.0                                                         FLINFO  234
C                                                                      FLINFO  235
C     READ SCALING INFORMATION                                         FLINFO  236
C                                                                      FLINFO  237
      READ (ITAPER,1) DSCALE , FSCALE , VSCALE                         FLINFO  238
      DEL=0.0001                                                       FLINFO  239
      IDPLEN=((DUB-DLB)/DSCALE) + DEL                                  FLINFO  240
      IFRLEN=(FUB/FSCALE)       + DEL                                  FLINFO  241
      IVLEN =(VUB/VSCALE)       + DEL                                  FLINFO  242
      IDPLEN  =  MAXO (1,IDPLEN)                                       FLINFO  243
      IFRLEN  =  MAXO (1,IFRLEN)                                       FLINFO  244
      IVLEN   =  MAXO (1,IVLEN)                                        FLINFO  245
      DPLEN   =  IDPLEN                                                FLINFO  246
      FRLEN   =  IFRLEN                                                FLINFO  247
      VLEN    =  IVLEN                                                 FLINFO  248
      FUB     =  FSCALE * FRLEN                                        FLINFO  249
      VUB     =  VSCALE * VLEN                                         FLINFO  250
      IDUB=(DUB/DSCALE) + DEL                                          FLINFO  251
      IF ( IDUB .EQ. 0 )      IDUB = SIGN (1.0,DUB)                    FLINFO  252
      DUB     =  IDUB                                                  FLINFO  253
      DUB     =  DUB * DSCALE                                          FLINFO  254
      DLB       =  DUB - DPLEN * DSCALE                                FLINFO  255
      IF ( ABS(DLB)/DSCALE .LT. 1.0 )    DLB = SIGN(1.0,DLB) * DSCALE  FLINFO  256
      DPLEN   =  (DUB - DLB) / DSCALE                                  FLINFO  257
      GO TO (101, 102, 103), LSD                                       FLINFO  258
  101 XDT       =  VLEN + 1.0                                          FLINFO  259
      VLN       =  FRLEN + DPLEN + 0.5                                 FLINFO  260
      IF ( VLN .GT. 9.0 )     GO TO 60                                 FLINFO  261
      GO TO 42                                                         FLINFO  262
  102 XDT       =  DPLEN + FRLEN + 3.5                                 FLINFO  263
      IF (VLEN  .GT. 9.0) GOTO 60                                      FLINFO  264
      GO TO 42                                                         FLINFO  265
  103 XDT       =  VLEN + 0.5                                          FLINFO  266
      TEST      =  AMAX1 (DPLEN , FRLEN) + 0.5                         FLINFO  267
      IF ( TEST .LE. 9.0 )    GO TO 42                                 FLINFO  268
   60 LC(14)    =  0                                                   FLINFO  269
      WRITE (ITAPEW,62)                                                FLINFO  270
C                                                                      FLINFO  271
C DENSITIES                                                            FLINFO  272
C                                                                      FLINFO  273
   42 NRO= LC(5)                                                       FLINFO  274
      READ(ITAPER,1) (RHOR(I), I= 1,NRO)                               FLINFO  275
C                                                                      FLINFO  276
C CHANGES TO THE GENERALIZED AIR FORCES                                FLINFO  277
C                                                                      FLINFO  278
      IF (LC(34) .EQ. 0) GOTO 70                                       FLINFO  279
                                                                       FLINFO  280
      READ (ITAPER,50)   NQWT , NQE                                    FLINFO  281
C     NQWT      =  NO. OF SURFACES FOR AERO MODAL ELIMINATION          FLINFO  282
C     NQE       =  NO. OF SURFACES FOR WHICH AERO. WT. FUNCTION NE 1   FLINFO  283
      IF ( NQWT .EQ. 0 )      GO TO 80                                 FLINFO  284
      DO 72  I = 1,NQWT                                                FLINFO  285
      READ (ITAPER,50)  ISF, NISF,  (NOA(J),J=1,NISF)                  FLINFO  286
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          DO 72  K = 1,NISF                                                 FLINFO    287
          NQAK = NQA(K)                                                     FLINFO    288
       72 QMWT(NQAK,ISF) = O.                                               FLINFO    289
       80 IF (NQE.EQ.O) GOTO 70                                             FLINFO    290
          DO 82  J = 1,NQE                                                  FLINFO    291
       82 READ (ITAPER,83)   I , QWT(I)                                     FLINFO    292
       70 CONTINUE                                                          FLINFO    293
    C                                                                       FLINFO    294
    C MODIFY DETERMINANT (MAYBE)                                            FLINFO    295
    C                                                                       FLINFO    296
          DO 32 I=1,NMD                                                     FLINFO    297
          DO 32 J=1,NMD                                                     FLINFO    298
       32 DETAD(I,J) = CMPLX (0.0,0.0)                                      FLINFO    299
          IF (LC(9) .EQ. O) GO TO 48                                        FLINFO    300
          READ (ITAPER,50)   NADD , NSYM                                    FLINFO    301
          DO 45  II = 1,NADD                                                FLINFO    302
       45 READ (ITAPER,46) I , J , DETAD(I,J)                               FLINFO    303
          IF (NSYM .NE.  O) GO TO 48                                        FLINFO    304
          DO 47  I = 1,NM                                                   FLINFO    305
          DO 47  J = 1,NM                                                   FLINFO    306
          IF ( J .GE. I )    GO TO 47                                       FLINFO    307
          DETAD(I,J)  =  DETAD(J,I)                                         FLINFO    308
       47 CONTINUE                                                          FLINFO    309
       48 CONTINUE                                                          FLINFO    310
    C                                                                       FLINFO    311
    C READ FROM CARDS CHANGES TO THE COMPLEX STIFFNESS MATRIX AND CALCULATE  FLINFO    312
    C LOWER TRIANGLE BASED UPON SYMMETRY OPTION                             FLINFO    313
    C                                                                       FLINFO    314
          IF (LC(32) .EQ. O) GOTO 35                                        FLINFO    315
          READ (ITAPER,50)   NADD , NSYM                                    FLINFO    316
          DO 33  K = 1,NADD                                                 FLINFO    317
       33 READ (ITAPER,34) I , J , B(I,J)                                   FLINFO    318
    C     FOR SYMMETRIC CONDITIONS SPECIFY TRIANGLE OF B MATRIX             FLINFO    319
          IF ( NSYM .NE. O ) GO TO 35                                       FLINFO    320
          DO 36 I = 1,NM                                                    FLINFO    321
          DO 36 J = 1,NM                                                    FLINFO    322
          IF ( J .GE. I )    GO TO 36                                       FLINFO    323
          B(I,J)   =  B(J,I)                                                FLINFO    324
       36 CONTINUE                                                          FLINFO·   325
       35 CONTINUE                                                          FLINFO    326
    C                                                                       FLINFO    327
    C DEFINE NUMBER OF STIFFNESS VARIATION CYCLES                           FLINFO    328
    C                                                                       FLINFO    329
          IF(LC(26).EQ.O) GO TO 66                                          FLINFO    330
          NOMA      =  LC(26)                                               FLINFO    331
          READ (ITAPER,1 )   (RATOM(I) , I=1,NOMA)                          FLINFO    332
       66 CONTINUE                                                          FLINFO    333
    C                                                                       FLINFO    334
    C                                                                       FLINFO    335
    C DEFINE MODE ELIMINATION CYCLES                                        FLINFO    336
    C                                                                       FLINFO    337
          IF(LC(25).EQ.O) GO TO 63                                          FLINFO    338
          NMIT      =  LC(25)                                               FLINFO    339
          DO 64  IIT = 1,NMIT                                               FLINFO    340
          READ (ITAPER,50) NOTIR, (NINZ(J,IIT), J=1,NOTIR)                  FLINFO    341
       64 NOTI(IIT)   =  NOTIR                                              FLINFO    342
       63 CONTINUE                                                          FLINFO    343
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      C                                                                        FLINFO    344
      C AUTOMATIC EXCLUSION OF MODES BASED ON RATIOS OF                        FLINFO    345
      C GENERALZED FORCES TO GENERALIZED MASSES                                FLINFO    346
      C                                                                        FLINFO    347
            IF (LC(1).NE.-1.OR.LC(38).NE.1)  GO TO 65                          FLINFO    348
            READ (ITAPER,1) QDW, VQDW                                          FLINFO    349
         65 CONTINUE                                                           FLINFO    350
      C                                                                        FLINFO    351
      C RANGE IN WHICH EIGENVECTORS ARE DESIRED                                FLINFO    352
      C                                                                        FLINFO    353
            IF(LC(28).EQ.0) GO TO 67                                           FLINFO    354
            IF (LC(1) .EQ. 2)  GO TO 67                                        FLINFO    355
            READ (ITAPER,1) VA , VB                                            FLINFO    356
            IF (LC(1) .LT. 0 .AND. VA .LT. V(1))   VA = V(1)                   FLINFO    357
            IF (LC(1) .LT. 0 .AND. VB .LT. V(NV))  VB = V(NV)                  FLINFO    358
            IF ( LC(1)  .EQ. -1 )   GO TO 67                                   FLINFO    359
            READ (ITAPER,1)  FLO , FHI                                         FLINFO    360
         67 CONTINUE                                                           FLINFO    361
      C                                                                        FLINFO    362
      C LIST GENERALIZED MASSES, FREQUENCIES, DAMPING, AND COMPLEX STIFFNESS    FLINFO    363
      C                                                                        FLINFO    364
            CALL PLB (1,1,ITAPEW)                                              FLINFO    365
            WRITE (ITAPEW,4100)                                                FLINFO    366
            CALL PLB (1,1,ITAPEW)                                              FLINFO    367
            KOUNT  =  KOUNT + 4                                                FLINFO    368
            NROWS  =  1                                                        FLINFO    369
            NCOLS  =  0                                                        FLINFO    370
            KTABLE =  2                                                        FLINFO    371
            CALL PTABLE (2,60,60                                               FLINFO    372
           1   HGENERALIZED MASS, FREQUENCY, AND GENERALIZED MODAL STIFFNESS)  FLINFO    373
            LSKIP  =  1                                                        FLINFO    374
            LSUB   =  4                                                        FLINFO    375
            KRETUR =  0                                                        FLINFO    376
        215 CALL HEAD (LTSHF,TSHF,NM,NM)                                       FLINFO    377
            GO TO (216, 217, 218), KHEAD                                       FLINFO    378
        216 WRITE (ITAPEW,1000)                                                FLINFO    379
        217 CALL PLB (1,1,ITAPEW)                                              FLINFO    380
            WRITE (ITAPEW,1001) (JC, JC=JCL,JCU)                               FLINFO    381
        218 WRITE (ITAPEW,1002)  IR, (WW(IR,JC), JC=JCL,JCU)                   FLINFO    382
            IF (KRETUR .LT. 3) GO TO 215                                       FLINFO    383
      C                                                                        FLINFO    384
            LSUB   =  5                                                        FLINFO    385
        235 CALL HEAD (LTSHF,TSHF,NM,3)                                        FLINFO    386
            GO TO (236, 237, 238), KHEAD                                       FLINFO    387
        236 WRITE (ITAPEW,2000)                                                FLINFO    388
        237 CALL PLB (1,1,ITAPEW)                                              FLINFO    389
        238 OMGRAD = OMGC(IR)*TWOPI                                            FLINFO    390
            WRITE (ITAPEW,1002) IR, OMGC(IR), OMGRAD, GDP(IR)                  FLINFO    391
            OMGR(IR) =  OMGRAD                                                 FLINFO    392
            IF (KRETUR .LT. 3) GO TO 235                                       FLINFO    393
      C                                                                        FLINFO    394
            KSAVE  =  KOLUMN                                                   FLINFO    395
            KOLUMN =  KOLUMN/2                                                 FLINFO    396
            LSUB   =  4                                                        FLINFO    397
        315 CALL HEAD (LTSHF,TSHF,NM,NM)                                       FLINFO    398
            GO TO (316, 317, 318), KHEAD                                       FLINFO    399
        316 WRITE (ITAPEW,3000)                                                FLINFO    400
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  317 CALL PLB (1,1,ITAPEW)                                          FLINFO   401
      WRITE (ITAPEW,3001) (JC, JC=JCL,JCU)                           FLINFO   402
  318 WRITE (ITAPEW,3002)  IR, (B(IR,JC), JC=JCL,JCU)                FLINFO   403
      IF (KRETUR .LT. 3) GO TO 315                                   FLINFO   404
      KOLUMN =  KSAVE                                                FLINFO   405
   73 CONTINUE                                                       FLINFO   406
C                                                                    FLINFO   407
C     WRITE OUT NECESSARY COMMON BLOCKS TO ENABLE PROGRAM TO PLOT    FLINFO   408
C     ALL CALCOMPS FOLLOWING CALCULATIONS                            FLINFO   409
      IF(LC(14).EQ.0) GO TO 71                                       FLINFO   410
      REWIND MTAP1                                                   FLINFO   411
      WRITE (MTAP1) (LC(I),I=1,40), BR, GMAX, GMIN, FRMAX, FRMIN,    FLINFO   412
     1              VMAX, VMIN, FMACH, BETA, VBO, RVBO, NRVBO,       FLINFO   413
     2              (TITLE1(J),J=1,18), (TITLE2(J),J=1,18),          FLINFO   414
     3              DUB, FUB, VUB, DLB, FLB, VLB, IPLOT, LSD,        FLINFO   415
     4              DSCALE, FSCALE, VSCALE, DPLEN, FRLEN, VLEN, XDT  FLINFO   416
C                                                                    FLINFO   417
C FORMATS                                                            FLINFO   418
C                                                                    FLINFO   419
    1 FORMAT (7E10.3)                                                FLINFO   420
    5 FORMAT (2I5,E10.3)                                             FLINFO   421
    9 FORMAT (I5,E10.3)                                              FLINFO   422
CIBM  BEGINNING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS  FLINFO   423
C  30 FORMAT (18A4)                                                  FLINFO   424
CIBM  ENDING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS     FLINFO   425
CCDC  BEGINNING OF STATEMENTS ASSOCIATED WITH CDC COMPUTER PROGRAMS  FLINFO   426
   30 FORMAT (7A10, 1A2)                                             FLINFO   427
CCDC  ENDING OF STATEMENTS ASSOCIATED WITH CDC COMPUTER PROGRAMS     FLINFO   428
   34 FORMAT (2I5,2E10.3)                                            FLINFO   429
   43 FORMAT (10X,1P8E13.4)                                          FLINFO   430
   46 FORMAT (2I5,2E10.3)                                            FLINFO   431
   49 FORMAT (I5,2E10.3)                                             FLINFO   432
   50 FORMAT (10I5)                                                  FLINFO   433
   55 FORMAT (I5,4E10.3)                                             FLINFO   434
   62 FORMAT (1H1,//20X, 53H***** VERTICAL PLOT IS GREATER THAN NINE INC FLINFO   435
     1HES *****,//20X, 57HCALCOMP COMMAND CANCELLED ****** REVISE INPUT  FLINFO   436
     2DATA ******,////)                                              FLINFO   437
   83 FORMAT (I5,E10.3)                                              FLINFO   438
 1000 FORMAT ( 10X, 20HGENERALIZED MASS, LB)                         FLINFO   439
 1001 FORMAT (10X,1X,4HMODE,2X,5HMODE=,1(  1I3,1X, 3(1H-))           FLINFO   440
     1                                  ,7(  1I4,1X, 9(1H-)))        FLINFO   441
 1002 FORMAT ( 10X, I5, 1P8E14.6)                                    FLINFO   442
 2000 FORMAT (10X,1X,4HMODE,2X,9HFREQUENCY,5X,9HFREQUENCY,5X,8HDAMPING  FLINFO   443
     1    ,/,10X,5X      ,2X,9HCYC/SEC  ,5X,9HRAD/SEC  ,5X,8HNO UNITS) FLINFO   444
 3000 FORMAT (10X,56HCOMPLEX GENERALIZED MODAL STIFFNESS, (REAL, IMAG), FLINFO   445
     1LB/IN)                                                         FLINFO   446
 3001 FORMAT (10X,1X,4HMODE,2X,5HMODE=,1(  1I3,1X,17(1H-))           FLINFO   447
     1                                  ,3(  1I4,1X,23(1H-)))        FLINFO   448
 3002 FORMAT (10X,I5,4(2X,1H(,1P1E11.4,1H,1X,1P1E11.4,1H)))          FLINFO   449
 4000 FORMAT (10X,58                                                 FLINFO   450
     1   HREDUCED VELOCITIES FOR INTERPOLATION OF GENERALIZED FORCES   FLINFO   451
     2      ,/10X,58(1H-))                                           FLINFO   452
 4100 FORMAT (10X,60                                                 FLINFO   453
     1   HGENERALIZED MASS, FREQUENCY, AND GENERALIZED MODAL STIFFNESS FLINFO   454
     2      ,/10X,60(1H-))                                           FLINFO   455
C                                                                    FLINFO   456
   71 RETURN                                                         FLINFO   457
```

```
                END                                                                          FLINFO    458


CARD NR. SEVERITY  DETAILS    DIAGNOSIS OF PROBLEM

    257     I                AN IF STATEMENT MAY BE MORE EFFICIENT THAN A 2 OR 3 BRANCH COMPUTED GO TO STATEMENT.
    377     I                AN IF STATEMENT MAY BE MORE EFFICIENT THAN A 2 OR 3 BRANCH COMPUTED GO TO STATEMENT.
    386     I                AN IF STATEMENT MAY BE MORE EFFICIENT THAN A 2 OR 3 BRANCH COMPUTED GO TO STATEMENT.
    398     I                AN IF STATEMENT MAY BE MORE EFFICIENT THAN A 2 OR 3 BRANCH COMPUTED GO TO STATEMENT.


      SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS     DEF LINE      REFERENCES
    1  FLINFO        1          456

VARIABLES     SN  TYPE          RELOCATION
 2201  ARG          REAL                            REFS       56     DEFINED      55
    0  B            COMPLEX     ARRAY    MODD       REFS        3        17       197       200       323       402
                                                 DEFINED      137       143       197       200       317       323
 2220  BB           REAL                            REFS      141       142       143   DEFINED       140       141
 2221  BD           REAL                            REFS      143   DEFINED       142
    1  BETA         REAL                 FLUTAN     REFS       18       411   DEFINED        56
   50  BR           REAL                 COMA       REFS       16        53       411   DEFINED        52        53
 2232  DEL          REAL                            REFS      239       240       241       250   DEFINED       238
 2170  DELB         COMPLEX                         REFS        4       197   DEFINED       196
 2230  DELD         REAL                            REFS      196   DEFINED       195
 2401  DELK         REAL        ARRAY               REFS       13       175       180       188       193       195       196
                                                   200    DEFINED       168       174       175       179       180       183
                                                   188       193
 2412  DELOM        REAL        ARRAY               REFS       13       188   DEFINED       169       187
 6200  DETAD        COMPLEX     ARRAY    MODD       REFS        3        17       307   DEFINED       298       302       307
   47  DLB          REAL                 CALCP      REFS       23       239     2*255       256       411
                                                 DEFINED      231       254       255
   57  DPLEN        REAL                 CALCP      REFS       23       254       259       262       266       411
                                                 DEFINED      245       256
   54  DSCALE       REAL                 CALCP      REFS       23       239       250       253       254     2*255       256
                                                   411    DEFINED       237
   44  DUB          REAL                 CALCP      REFS       23       239       250       251       253       254       256
                                                   411    DEFINED       231       252       253
   32  DV           REAL                 FLUTB      REFS       19        80   DEFINED        77
    3  FHI          REAL                 FLUTV      REFS       21   DEFINED       359
   50  FLB          REAL                 CALCP      REFS       23       411   DEFINED       232
    2  FLO          REAL                 FLUTV      REFS       21   DEFINED       359
    0  FMACH        REAL                 FLUTAN     REFS       18      2*55       411   DEFINED        52
   60  FRLEN        REAL                 CALCP      REFS       23       248       259       262       266       411
                                                 DEFINED      246
    2  FRMAX        REAL                 PRPL       REFS       25       411   DEFINED       212
    3  FRMIN        REAL                 PRPL       REFS       25       411   DEFINED       211
   55  FSCALE       REAL                 CALCP      REFS       23       240       248       411   DEFINED       237
   45  FUB          REAL                 CALCP      REFS       23       240       411   DEFINED       231       248
```

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VARIABLES      SN  TYPE             RELOCATION
 2331  GDP          REAL        ARRAY               REFS        7       44      142      195      390
                                                 DEFINED      125      129
    0  GMAX         REAL                 PRPL       REFS       25      411  DEFINED      212
    1  GMIN         REAL                 PRPL       REFS       25      411  DEFINED      212
 2203  I            INTEGER                         REFS       69     2*80       85       93      106      110    2*111
                                                      125      137      138      139      140      142      143      158
                                                    3*166      168      169    3*174    2*175    2*187    5*188    2*193
                                                      194    2*195      196    2*197    3*200      226      227      274
                                                      291      298      302      306    2*307      317      322    2*323
                                                      331      411  DEFINED       69       79       85       93      106
                                                      108      114      124      128      135      157      165      172
                                                      185      191      226      227      274      284      291      296
                                                      302      304      317      320      331      411
 2206  IADD         INTEGER                         REFS      113      114  DEFINED      103
 2233  IDPLEN       INTEGER                         REFS      242      245  DEFINED      239      242
 2236  IDUB         INTEGER                         REFS      251      252  DEFINED      250      251
    4  IE           INTEGER              FLUTV      REFS       21
 2234  IFRLEN       INTEGER                         REFS      243      246  DEFINED      240      243
 2210  II           INTEGER                         REFS      115  DEFINED      105      115      301
 2254  IIT          INTEGER                         REFS      340      341  DEFINED      339
   52  IPLOT        INTEGER              CALCP      REFS       23      411
    3  IR           INTEGER              CHEAD      REFS       32    2*381      389    3*390      391    2*402
 2215  IREF         INTEGER                         REFS      133  DEFINED      132
 2244  ISF          INTEGER                         REFS      288  DEFINED      285
    2  ITAPEP       INTEGER              COMRWP     REFS       30
    0  ITAPER       INTEGER              COMRWP     REFS       30 I/O REFS       52       69       77       84       85
                                                      103      106      115      123      127      129      154      212
                                                      226      227      231      237      274      280      285      291
                                                      300      302      315      317      331      340      348      355
                                                      359
    0  ITAPES       INTEGER     ARRAY    CTAPES     REFS        6       15       39
    7  ITAPET       INTEGER              CTABLE     REFS       28
    1  ITAPEW       INTEGER              COMRWP     REFS       30       88       91      364      366      379      388
                                                      400 I/O REFS       90       93      269      365      378      380
                                                      381      387      390      399      401      402
 2235  IVLEN        INTEGER                         REFS      244      247  DEFINED      241      244
 2214  I1           INTEGER                         REFS      129  DEFINED      129
 2211  J            INTEGER                         REFS      106      110    2*111      137      138      140      143
                                                      168      169    2*174    2*175    2*183    2*187    7*188    2*193
                                                      194      195      196    2*197    3*200      285      298      302
                                                      306    2*307      317      322    2*323      340    2*411
                                                 DEFINED      106      109      136      167      173      182      186
                                                      192      285      290      297      302      305      317      321
                                                      340    2*411
 2256  JC           INTEGER                         REFS      380      381      401      402  DEFINED      380      381
                                                      401      402
    4  JCL          INTEGER              CHEAD      REFS       32      380      381      401      402
    5  JCU          INTEGER              CHEAD      REFS       32      380      381      401      402
 2246  K            INTEGER                         REFS      287  DEFINED      286      316
    7  KBPAGE       INTEGER              CLIST      REFS       26
    0  KHEAD        INTEGER              CHEAD      REFS       32      377      386      398
    4  KLABEL       INTEGER              CLIST      REFS       26
    2  KOLUMN       INTEGER              CHEAD      REFS       32      394      395  DEFINED       48       49      395
                                                      404
    0  KOUNT        INTEGER              CLIST      REFS       26       86       89       92      367
                                                 DEFINED       86       89       92      367
   11  KOUNTH       INTEGER              CLIST      REFS       26
```

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VARIABLES     SN  TYPE          RELOCATION
   12  KOUNTI     INTEGER             CLIST      REFS       26
    1  KPAGE      INTEGER             CLIST      REFS       26
    0  KREPUR     INTEGER             REPORT     REFS       31        49
    1  KRETUR     INTEGER             CHEAD      REFS       32       382       392       403   DEFINED       375
 2260  KSAVE      INTEGER                        REFS      404   DEFINED       394
    0  KTABLE     INTEGER             CTABLE     REFS       28   DEFINED        96       370
    5  KTABLU     INTEGER             CTABLE     REFS       28
    5  KTPAGE     INTEGER             CLIST      REFS       26
    0  LC         INTEGER   ARRAY     COMA       REFS        9        16        38        54        58        59        60
                                                   61       62        63        64        68        70        71       102
                                                  121      122       131       132       141       193       204       213
                                                  273      278       299       314       329       330       337       338
                                                2*347      353       354       356       357       358       409       411
                                              DEFINED       58        59        60        61        76       268
    2  LC38       INTEGER             QELIM      REFS       34   DEFINED        38
    2  LINES      INTEGER             CLIST      REFS       26      2*86
   10  LINESG     INTEGER             CLIST      REFS       26
    3  LINEST     INTEGER             CLIST      REFS       26
   53  LSD        INTEGER             CALCP      REFS       23       257       411   DEFINED       231
    7  LSKIP      INTEGER             CHEAD      REFS       32   DEFINED       373
    6  LSUB       INTEGER             CHEAD      REFS       32   DEFINED       374       384       396
 2231  LTITLE     INTEGER                        REFS      226       227   DEFINED       224
    0  LTSHF      INTEGER             CTSHF      REFS       33       376       385       397
 2205  MADD       INTEGER                        REFS      104       105   DEFINED       103
 2207  MSYM       INTEGER                        REFS      107   DEFINED       103
 2172  MTAP1      INTEGER                     DEFINED       39  I/O REFS       410       411
 2250  NADD       INTEGER                        REFS      301       316   DEFINED       300       315
17550  NC         INTEGER             MODD       REFS       17
 2213  NCD        INTEGER                        REFS      128   DEFINED       127
    3  NCOLS      INTEGER             CTABLE     REFS       28   DEFINED        95       369
    4  NCOLST     INTEGER             CTABLE     REFS       28
   43  NINZ       INTEGER   ARRAY     FLUTC      REFS        8        20   DEFINED       340
 2245  NISF       INTEGER                        REFS      285       286   DEFINED       285
 2200  NM         INTEGER                        REFS      108       109       124       135       136       304       305
                                                  320      321     2*376       385     2*397   DEFINED        54
 2176  NMD        INTEGER                        REFS       44        46       296       297   DEFINED        43
 2253  NMIT       INTEGER                        REFS      339   DEFINED       338
 2252  NOMA       INTEGER                        REFS      331   DEFINED       330
   12  NOTI       INTEGER   ARRAY     FLUTC      REFS        8        20   DEFINED       341
 2255  NOTIR      INTEGER                        REFS      340       341   DEFINED       340
    6  NPAGE      INTEGER             CLIST      REFS       26
    6  NPAGEA     INTEGER             CTABLE     REFS       28
    1  NPASS      INTEGER             CTABLE     REFS       28
 2261  NQA        INTEGER   ARRAY                REFS        7       287   DEFINED       285
 2247  NQAK       INTEGER                        REFS      288   DEFINED       287
 2243  NQE        INTEGER                        REFS      289       290   DEFINED       280
 2175  NQED       INTEGER                        REFS       45        46   DEFINED        42
 2242  NQWT       INTEGER                        REFS      283       284   DEFINED       280
    5  NQZ        INTEGER             FLUTV      REFS       21
 2225  NRBROT     INTEGER                        REFS      162       178   DEFINED       161
 2223  NRBTOT     INTEGER                        REFS      161       165       167       173       182       186       191
                                                  192  DEFINED       154
 2222  NRBTR      INTEGER                        REFS      155       157       161       163       172       185
                                              DEFINED      154
 2241  NRO        INTEGER                        REFS      274   DEFINED       273
 2226  NRCT1      INTEGER                        REFS      173       182       186   DEFINED       163
    2  NROWS      INTEGER             CTABLE     REFS       28   DEFINED        94       368
```
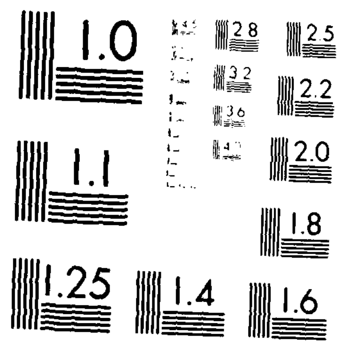

AD-A152 270 ESP (EXTERNAL-STORES PROGRAM) - A PILOT COMPUTER PROGRAM FOR DETERMINING..(U) GRUMMAN AEROSPACE CORP BETHPAGE NY J B SMEDFJELD FEB 85 ADCR-85-1-VOL-3-PT-1 6/8

UNCLASSIFIED N00019-81-C-0395 F/G 9/2 NL



MICROCOPY RESOLUTION TEST CHART

```
VARIABLES       SN  TYPE            RELOCATION
    57  NRVBO       INTEGER            FLUTAN    REFS       18      85      93     411  DEFINED      84
  2251  NSYM        INTEGER                      REFS      303     319 DEFINED     300     315
    31  NV          INTEGER            FLUTB     REFS       19      79   2*357 DEFINED      77
  2202  NVBO        INTEGER                      REFS       69 DEFINED      68
     6  NVTOT       INTEGER            FLUTV     REFS       21
 17500  OMGC        REAL        ARRAY  MODD      REFS        7      36     133     139     158   2*166     389
                                                  390  DEFINED     115
 17500  OMGR        REAL        ARRAY  MODD      REFS        7      17      36 DEFINED     391
  2257  OMGRAD      REAL                         REFS      390     391 DEFINED     389
  2216  OMGR2       REAL                         REFS      134     140 DEFINED     133     139
  2424  OMRBSQ      REAL        ARRAY            REFS       13     174     179   2*187 DEFINED     166
  2174  ONE         REAL                         REFS       45      46 DEFINED      41
  2217  UREF        REAL                         REFS      141     193 DEFINED     134
     0  QDW         REAL               QELIM     REFS       34 DEFINED     348
     0  QMWT        REAL        ARRAY  FLUTQ     REFS        8      22      46 DEFINED     288
   310  QWT         REAL        ARRAY  FLUTQ     REFS        8      22      45 DEFINED     291
  2013  RATOM       REAL        ARRAY  FLUTC     REFS        8      20 DEFINED     331
     0  RHOR        REAL        ARRAY  FLUTC     REFS       10      20 DEFINED     274
    40  RVBO        REAL        ARRAY  FLUTAN    REFS       10      18      93     411 DEFINED      85
  2224  SUMOMG      REAL                         REFS      158     160 DEFINED     156     158
  2240  TEST        REAL                         REFS      267 DEFINED     266
     0  TITLE1      REAL        ARRAY  CALCP     REFS       11      23     411 DEFINED     226
    22  TITLE2      REAL        ARRAY  CALCP     REFS       11      23     411 DEFINED     227
     1  TSHF        REAL        ARRAY  CTSHF     REFS       12      33     376     385     397
  2177  TWOPI       REAL                         REFS      133     139   2*164     389 DEFINED      47
  2227  TWPISQ      REAL                         REFS      166 DEFINED     164
     0  V           REAL        ARRAY  FLUTB     REFS       11      19      80   2*356   2*357
                                              DEFINED       78      80
     0  VA          REAL               FLUTV     REFS       21     356 DEFINED     355     356
     1  VB          REAL               FLUTV     REFS       21     357 DEFINED     355     357
     2  VBO         REAL        ARRAY  FLUTAN    REFS       10      18     411 DEFINED      69
    51  VLB         REAL               CALCP     REFS       23     411 DEFINED     233
    61  VLEN        REAL               CALCP     REFS       23     249     258     263     265     411
                                              DEFINED      247
  2237  VLN         REAL                         REFS      260 DEFINED     259
     4  VMAX        REAL               PRPL      REFS       25     411 DEFINED     212
     5  VMIN        REAL               PRPL      REFS       25     411 DEFINED     210
     1  VQDW        REAL               QELIM     REFS       34 DEFINED     348
    56  VSCALE      REAL               CALCP     REFS       23     241     249     411 DEFINED     237
    46  VUB         REAL               CALCP     REFS       23     241     411 DEFINED     231     249
  2204  V1          REAL                         REFS       78 DEFINED      77
 14400  WW          REAL        ARRAY  MODD      REFS        7      17     111     140     174     179   3*188
                                                  381  DEFINED     106     111
    62  XDT         REAL               CALCP     REFS       23     411 DEFINED     258     262     265
  2173  ZERO        REAL                         REFS       44 DEFINED      40
        VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS           TYPE     ARGS        REFERENCES
        DVALUE                 3             44      45      46
        HEAD                   4            376     385     397
        PLB                    3             88      91     364     366     379     388     400
        PROGNA                 2             50
        PTABLE                 3             97     371
        SQRT        REAL       1 LIBRARY     56
        TITLES                 1             87
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INLINE FUNCTIONS    TYPE    ARGS         DEF LINE  REFERENCES
       ABS          REAL       1  INTRIN               55         255
       AMAX1        REAL       0  INTRIN              266
       CMPLX        COMPLEX    2  INTRIN              137         143        196        298
       MAXO         INTEGER    0  INTRIN              242         243        244
       SIGN         REAL       2  INTRIN              251         255

STATEMENT LABELS              DEF LINE   REFERENCES
  2001  1       FMT              419         52          69         85        123        212        237        274        331        348
                                            355         359
   210  3                        113        104         107
     0  4                        106        105
  2003  5       FMT              420        106
   203  6                        112        108         109        110
   223  7                        116        102         113
     0  8                        115        114
  2006  9       FMT              421         84         115        129
   107  10                        84         71
   146  11                       102         72
   252  21                       131         62         121
   236  22                       127        122
     0  23                       125        124
   252  24                       130        126
     0  25                       129        128
   260  28                       135        131
    74  29                        76         64
  2010  30      FMT              426        226         227
   304  31                       144        135         136        138
     0  32                       298        296         297
     0  33                       317        316
  2012  34      FMT              428        317
  1021  35                       325        314         319
  1013  36                       324        320         321        322
   625  42                       273        204         213        261        264        267
  2015  43      FMT              429         93
     0  45                       302        301
  2020  46      FMT              430        302
   750  47                       308        304         305        306
   756  48                       309        299         303
  2023  49      FMT              431         77
  2026  50      FMT              432        103         127        154        280        285        300        315        340
     0  51                        80         79
  2030  55      FMT              433        231
   622  60                       268        260         263
  2033  62      FMT              434        269
  1050  63                       342        337
     0  64                       341        339
  1056  65                       349        347
  1030  66                       332        329
  1077  67                       360        353         354        358
   677  70                       292        278         289
  1301  71                       456        409
     0  72                       288        284         286
  1274  73                       405         63          70
   664  80                       289        283
     0  82                       291        290
  2052  83      FMT              437        291
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STATEMENT LABELS              DEF LINE   REFERENCES
     0  87                        159        157
     0  89                        170        167
     0  90                        171        165
     0  92                        176        173
     0  93                        177        172
   400  95                        181        178
     0  96                        184        182
     0  97                        189        186
     0  98                        190        185
   576  101                       258        257
   605  102                       262        257
   613  103                       265        257
   463  108                       199        194
   465  109                       201        192        198
     0  110                       202        191
   473  115                       203        155        160        162
  1117  215                       376        382
  1131  216                       378        377
  1133  217                       379        377
  1146  218                       381        377
  1167  235                       385        392
  1201  236                       387        386
  1203  237                       388        386
  1205  238                       389        386
     0  300          INACTIVE      68
  1223  315                       397        403
  1235  316                       399        398
  1237  317                       400        398
  1252  318                       402        398
  2054  1000    FMT               438        378
  2060  1001    FMT               439        380
  2067  1002    FMT               441        381        390
  2072  2000    FMT               442        387
  2105  3000    FMT               444        399
  2115  3001    FMT               446        401
  2124  3002    FMT               448        402
  2132  4000    FMT               449         90
  2143  4100    FMT               452        365

LOOPS   LABEL   INDEX   FROM-TO    LENGTH   PROPERTIES
  103   51      I        79 80        3B     INSTACK
  153   4       II      105 106      13B                EXT REFS
  170   6       I       108 112      20B                NOT INNER
  200   6       J       109 112       5B     INSTACK
  212   8       I       114 115      11B                EXT REFS
  232   23      I       124 125       3B     INSTACK
  241   25      I       128 129      11B                EXT REFS
  261   31      I       135 144      31B                NOT INNER
  272   31      J       136 144      14B        OPT
  320   87      I       157 159       3B     INSTACK
  332   90      I       165 171      16B                NOT INNER
  341   89      J       167 170       3B     INSTACK
  351   93      I       172 177      22B                NOT INNER
  364   92      J       173 176       4B     INSTACK
  404   96      J       182 184       2B     INSTACK
  410   98      I       185 190      26B                NOT INNER
  423   97      J       186 189       7B     INSTACK
```

```
LOOPS  LABEL    INDEX     FROM-TO     LENGTH    PROPERTIES
  437  110      I          191 202       34B                  NOT INNER
  451  109      J          192 201       16B         OPT
  640  72       I          284 288       24B                  EXT REFS  NOT INNER
  654  72       K          286 288        4B      INSTACK
  666  82       J          290 291       11B                  EXT REFS
  700  32       I          296 298       14B                  NOT INNER
  706  32       J          297 298        2B      INSTACK
  717  45       II         301 302       13B                  EXT REFS
  734  47       I          304 308       22B                  NOT INNER
  744  47       J          305 308        6B      INSTACK
  762  33       K          316 317       13B                  EXT REFS
  777  36       I          320 324       22B                  NOT INNER
 1007  36       J          321 324        6B      INSTACK
 1033  64       IIT        339 341       15B                  EXT REFS
 1141           JC         380 380        4B                  EXT REFS
 1152           JC         381 381       11B                  EXT REFS
 1245           JC         401 401        4B                  EXT REFS
 1256           JC         402 402       11B                  EXT REFS

COMMON BLOCKS   LENGTH     MEMBERS - BIAS NAME(LENGTH)
       CTAPES       50              0 ITAPES (50)
       COMA         41              0 LC     (40)               40 BR     (1)
       MODD       8041              0 B      (3200)           3200 DETAD  (3200)          6400 WW     (1600)
                                 8000 OMGR   (40)             8040 NC     (1)
       FLUTAN       48              0 FMACH  (1)                 1 BETA   (1)                2 VBO    (30)
                                   32 RVBO   (15)               47 NRVBO  (1)
       FLUTB        27              0 V      (25)               25 NV     (1)               26 DV     (1)
       FLUTC      1055              0 RHOR   (10)               10 NOTI   (25)              35 NINZ   (1000)
                                 1035 RATOM  (20)
       FLUTV         7              0 VA     (1)                 1 VB     (1)                2 FLO    (1)
                                    3 FHI    (1)                 4 IE     (1)                5 NQZ    (1)
                                    6 NVTOT  (1)
       FLUTQ       205              0 QMWT   (200)             200 QWT    (5)
       CALCP        51              0 TITLE1 (18)               18 TITLE2 (18)              36 DUB    (1)
                                   37 FUB    (1)                38 VUB    (1)               39 DLB    (1)
                                   40 FLB    (1)                41 VLB    (1)               42 IPLOT  (1)
                                   43 LSD    (1)                44 DSCALE (1)               45 FSCALE (1)
                                   46 VSCALE (1)                47 DPLEN  (1)               48 FRLEN  (1)
                                   49 VLEN   (1)                50 XDT    (1)
       PRPL          6              0 GMAX   (1)                 1 GMIN   (1)                2 FRMAX  (1)
                                    3 FRMIN  (1)                 4 VMAX   (1)                5 VMIN   (1)
       CLIST        11              0 KOUNT  (1)                 1 KPAGE  (1)                2 LINES  (1)
                                    3 LINEST (1)                 4 KLABEL (1)                5 KTPAGE (1)
                                    6 NPAGE  (1)                 7 KBPAGE (1)                8 LINESG (1)
                                    9 KOUNTH (1)                10 KOUNTI (1)
       CTABLE        8              0 KTABLE (1)                 1 NPASS  (1)                2 NROWS  (1)
                                    3 NCOLS  (1)                 4 NCOLST (1)                5 KTABLO (1)
                                    6 NPAGEA (1)                 7 ITAPET (1)
       COMRWP        3              0 ITAPER (1)                 1 ITAPEW (1)                2 ITAPEP (1)
       REPORT        1              0 KREPOR (1)
       CHEAD         8              0 KHEAD  (1)                 1 KRETUR (1)                2 KOLUMN (1)
                                    3 IR     (1)                 4 JCL    (1)                5 JCU    (1)
                                    6 LSUB   (1)                 7 LSKIP  (1)
       CTSHF         2              0 LTSHF  (1)                 1 TSHF   (1)
       QELIM         3              0 QDW    (1)                 1 VQDW   (1)                2 LC38   (1)
```

```
 EQUIV CLASSES    LENGTH     MEMBERS - BIAS NAME(LENGTH)
B       OMGR         40                0 OMGC    (40)

 STATISTICS
   PROGRAM LENGTH                 2450B     1320
   CM LABELED COMMON LENGTH     22537B     9567
          52000B CM USED
```

```
      C                                                                  MOVIS      2
            SUBROUTINE MOVIS (IS,IM,ID,NBOXS,IFB,KLUE,XI)                MOVIS      3
      C                                                                  MOVIS      4
      C        ROUTINE PRESENTS A VISUALIZATION OF THE MODE SHAPES       MOVIS      5
      C        OF A SURFACE BY PRINTING DEFLECTIONS IN DIGITAL           MOVIS      6
      C        FORMAT AT THE COLLOCATION POINTS ON THE PLANFORM.         MOVIS      7
      C        BOTH H AND ALPHA ARE PRINTED.                             MOVIS      8
      C        R. CHIPMAN 1973.                                          MOVIS      9
      C                                                                  MOVIS     10
      C                                                                  MOVIS     11
      CIBM                                                               MOVIS     12
      C     DIMENSION TITLE(18)                                          MOVIS     13
      CIBM                                                               MOVIS     14
      CCDC                                                               MOVIS     15
            DIMENSION TITLE(8)                                           MOVIS     16
      CCDC                                                               MOVIS     17
      C                                                                  MOVIS     18
            COMMON /MODV/ X(400) , Y(400) , ZZ(400)                      MOVIS     19
            COMMON / CTAPES / ITAPES                                     MOVIS     20
            DIMENSION XI(NBOXS) ,YV(200),IPRINT(33)                      MOVIS     21
            DIMENSION DEF(400)                                           MOVIS     22
            DIMENSION YZ(800)                                            MOVIS     23
            DIMENSION BLANK(37), FMT(37)                                 MOVIS     24
            COMMON /COMRWP/ ITAPER ,ITAPEW,ITAPEP                        MOVIS     25
            COMMON /CLIST / KOUNT ,KPAGE ,LINES ,LINEST,KLABEL,KTPAGE,NPAGE  MOVIS     26
           1                ,KBPAGE,LINESG,KOUNTH,KOUNTI                 MOVIS     27
            COMMON /CTABLE/ KTABLE,NPASS ,NROWS ,NCOLS ,NCOLST,KTABLO,NPAGEA MOVIS     28
           1                ,ITAPET                                      MOVIS     29
            DIMENSION ITAPES(50)                                         MOVIS     30
            EQUIVALENCE (YZ(1),Y(1))                                     MOVIS     31
            DATA WORD /4H,1I3/                                           MOVIS     32
            DATA BLANK /4H(2X,,4HG10.,4H4,8X,    33*4H,03X,4H,1X)/       MOVIS     33
            DATA KLU  /4HKERN/                                           MOVIS     34
      C                                                                  MOVIS     35
      C INITIAL CONDITIONS                                               MOVIS     36
      C                                                                  MOVIS     37
            KOUNT  =  LINES                                              MOVIS     38
            ITAP18 =  ITAPES(18)                                         MOVIS     39
            IF (IS .GT. 1 .OR. IM .GT. 1 .OR. ID .GT. 2) GO TO 100       MOVIS     40
            CALL TITLES(2)                                               MOVIS     41
            CALL PLB (1,2,ITAPEW)                                        MOVIS     42
            WRITE (ITAPEW,4000)                                          MOVIS     43
            CALL PLB (1,1,ITAPEW)                                        MOVIS     44
            KOUNT  =  KOUNT + 5                                          MOVIS     45
            NROWS  =  1                                                  MOVIS     46
            NCOLS  =  0                                                  MOVIS     47
            KTABLE =  2                                                  MOVIS     48
            CALL PTABLE (2,46,46                                         MOVIS     49
           1   HGRAPHICAL REPRESENTATION OF INTERPOLATED MODES)          MOVIS     50
            KOUNT  =  LINES                                              MOVIS     51
        100 CONTINUE                                                     MOVIS     52
      C                                                                  MOVIS     53
      C        FIND MAXIMUMS AND MINIMUMS                                MOVIS     54
      C                                                                  MOVIS     55
            ILB= IFB + NBOXS - 1                                         MOVIS     56
            IH = 0                                                       MOVIS     57
            DU = 0                                                       MOVIS     58
```

```
      XU = X(IFB)                                                       MOVIS     59
      YU = Y(IFB)                                                       MOVIS     60
      ZU =ZZ(IFB)                                                       MOVIS     61
      DL = 0.                                                           MOVIS     62
      XL = XU                                                           MOVIS     63
      YL = YU                                                           MOVIS     64
      ZL = ZU                                                           MOVIS     65
      DO 1 I= IFB,ILB                                                   MOVIS     66
      IH = 1 + IH                                                       MOVIS     67
      D = XI(IH)                                                        MOVIS     68
      X1 = X(I)                                                         MOVIS     69
      Y1 = Y(I)                                                         MOVIS     70
      Z1 =ZZ(I)                                                         MOVIS     71
      IF(D.LT.DL) DL = D                                                MOVIS     72
      IF (X1.LT.XL) XL=X1                                               MOVIS     73
      IF (Y1.LT.YL) YL=Y1                                               MOVIS     74
      IF (Z1.LT.ZL) ZL=Z1                                               MOVIS     75
      IF (D.GT.DU) DU = D                                               MOVIS     76
      IF (X1.GT.XU) XU=X1                                               MOVIS     77
      IF (Y1.GT.YU) YU=Y1                                               MOVIS     78
      IF (Z1.GT.ZU) ZU=Z1                                               MOVIS     79
    1 CONTINUE                                                          MOVIS     80
C                                                                       MOVIS     81
C          SCALE DEFLECTIONS AND SET EXPONENT                           MOVIS     82
C                                                                       MOVIS     83
      DL = ABS(DL)                                                      MOVIS     84
      IF (DL.GT.DU) DU = DL                                             MOVIS     85
      IEX = 0                                                           MOVIS     86
      IF (DU.GT.1.0) GO TO 2                                            MOVIS     87
      IF(DU.GT.0.1) GO TO 3                                             MOVIS     88
      DO 4 I    = 1,10                                                  MOVIS     89
      IEX = - I                                                         MOVIS     90
      DU = 10.*DU                                                       MOVIS     91
      IF (DU.GT.0.1) GO TO 3                                            MOVIS     92
    4 CONTINUE                                                          MOVIS     93
      GO TO 3                                                           MOVIS     94
    2 DO 6 I = 1,10                                                     MOVIS     95
      IEX = I                                                           MOVIS     96
      DU = DU/10.                                                       MOVIS     97
      IF (DU.LE.1.0) GO TO 3                                            MOVIS     98
    6 CONTINUE                                                          MOVIS     99
    3 DO 10 I = 1,NBOXS                                                 MOVIS    100
   10 DEF(I) = XI(I) * (10.0**(-IEX))                                   MOVIS    101
      IEX = IEX - 2                                                     MOVIS    102
      IEXX  =  -IEX                                                     MOVIS    103
      GO TO (600,400,500), ID                                           MOVIS    104
C                                                                       MOVIS    105
  400 CONTINUE                                                          MOVIS    106
      REWIND ITAP18                                                     MOVIS    107
      WRITE (ITAP 18,1000) IEXX, IS, IM                                 MOVIS    108
      REWIND ITAP18                                                     MOVIS    109
      READ (ITAP18,3000) TITLE                                          MOVIS    110
      CALL TITLES (-1)                                                  MOVIS    111
      CALL PLB (1,1,ITAPEW)                                             MOVIS    112
      WRITE (' 'PEW,2000) IEXX, IS, IM                                  MOVIS    113
      CALL PLB (1,1,ITAPEW)                                             MOVIS    114
      KOUNT  =  KOUNT +4                                                MOVIS    115
```

```
      NROWS  =  0                                                    MOVIS     116
      NCOLS  =  2                                                    MOVIS     117
      KTABLE = 2                                                     MOVIS     118
      CALL PTABLE (2,58,TITLE)                                       MOVIS     119
      GO TO 600                                                      MOVIS     120
C                                                                    MOVIS     121
  500 CONTINUE                                                       MOVIS     122
      REWIND ITAP18                                                  MOVIS     123
      WRITE (ITAP18,1100) IEXX, IS, IM                               MOVIS     124
      REWIND ITAP18                                                  MOVIS     125
      READ (ITAP18,3000) TITLE                                       MOVIS     126
      CALL TITLES (-1)                                               MOVIS     127
      CALL PLB (1,1,ITAPEW)                                          MOVIS     128
      WRITE (ITAPEW,2100) IEXX, IS,IM                                MOVIS     129
      CALL PLB (1,1,ITAPEW)                                          MOVIS     130
      KOUNT  =  KOUNT +4                                             MOVIS     131
      NROWS  =  0                                                    MOVIS     132
      NCOLS  =  2                                                    MOVIS     133
      KTABLE = 2                                                     MOVIS     134
      CALL PTABLE (2,58,TITLE)                                       MOVIS     135
C                                                                    MOVIS     136
  600 CONTINUE                                                       MOVIS     137
C                                                                    MOVIS     138
C         X-Y OR X-Z PLANE ?                                         MOVIS     139
C                                                                    MOVIS     140
      CMAX  = XU-XL                                                  MOVIS     141
      SY = YU-YL                                                     MOVIS     142
      SZ = ZU-ZL                                                     MOVIS     143
      SPAN  = SY                                                     MOVIS     144
      IB1 = 0                                                        MOVIS     145
      IF (SY.LT.SZ) IB1=400                                          MOVIS     146
      IF (SY.LT.SZ) YL =ZL                                           MOVIS     147
      IF (SY.LT.SZ) SPAN=SZ                                          MOVIS     148
      SCALE = 6.*SPAN/5.                                             MOVIS     149
      IF (CMAX.GT.SPAN) SCALE= 6.*CMAX/5.                            MOVIS     150
C                                                                    MOVIS     151
      NSB = 0                                                        MOVIS     152
      R        = 0.0                                                 MOVIS     153
      IU = 1                                                         MOVIS     154
      YV(1) = 0.0                                                    MOVIS     155
      IY = -1                                                        MOVIS     156
      DO 120 I = 1,NBOXS                                             MOVIS     157
      MBOX    = IFB + I - 1                                          MOVIS     158
      MBOX  =  MBOX + IB1                                            MOVIS     159
      YS       = YZ(MBOX)                                            MOVIS     160
      IF (YS.EQ.R) GO TO 120                                         MOVIS     161
      DO 301 NU = 1,IU                                               MOVIS     162
      RU = YV(NU)                                                    MOVIS     163
      IF (YS.EQ. RU) GO TO 120                                       MOVIS     164
  301 CONTINUE                                                       MOVIS     165
      IU = IU + 1                                                    MOVIS     166
      YV(IU) = YS                                                    MOVIS     167
      NSB = NSB + 1                                                  MOVIS     168
      R        = YS                                                  MOVIS     169
C                                                                    MOVIS     170
C         IS THIS R SIGNIFICANTLY DIFFERENT FROM THE LAST ?          MOVIS     171
C                                                                    MOVIS     172
```

```
      IYL = IY                                                          MOVIS     173
      IY = 60.*(R - YL) / SCALE                                         MOVIS     174
      IF (KLUE.EQ.KLU)  IY = 60.*(YU-R) / SCALE                         MOVIS     175
      IF (IY.EQ.IYL) GO TO 120                                          MOVIS     176
C                                                                       MOVIS     177
C        CLEAR THE PRINT RECORD                                         MOVIS     178
C                                                                       MOVIS     179
      DO 5 J = 1,37                                                     MOVIS     180
    5 FMT(J) = BLANK(J)                                                 MOVIS     181
C                                                                       MOVIS     182
C     SEARCH ALL PANELS, SELECTING  THOSE WHERE Y=R. THESE BECOME THE   MOVIS     183
C     BOXES TO BE PLOTTED CHORDWISE. NFB COUNTS THESE.                  MOVIS     184
C                                                                       MOVIS     185
      NFB = 0                                                           MOVIS     186
      IX  =  -1                                                         MOVIS     187
      DO 8 II    = 1,NBOXS                                              MOVIS     188
      J = IFB + II - 1                                                  MOVIS     189
      J  =  J + IB1                                                     MOVIS     190
      IF  (YZ(J) .NE. R) GO TO 8                                        MOVIS     191
C                                                                       MOVIS     192
C        DIGITIZE DEFLECTIONS AND COORDINATES TO FIT PAGE               MOVIS     193
C                                                                       MOVIS     194
      IXL = IX                                                          MOVIS     195
      IX = 33.*( X(J) - XL) / SCALE                                     MOVIS     196
      IF(IX.EQ.IXL) GO TO 8                                             MOVIS     197
      FMT(IX+4) = WORD                                                  MOVIS     198
   35 NFB = NFB + 1                                                     MOVIS     199
      IPRINT(NFB) = 100.*DEF(II)                                        MOVIS     200
    8 CONTINUE                                                          MOVIS     201
C                                                                       MOVIS     202
C     PRINTOUT                                                          MOVIS     203
C                                                                       MOVIS     204
      IYDIF = IY - IYL - 1                                              MOVIS     205
      IF (IYDIF.LT.1) GO TO 9                                           MOVIS     206
      DO 7 J = 1,IYDIF                                                  MOVIS     207
    7 WRITE (ITAPEW,701)                                                MOVIS     208
  701 FORMAT (1H )                                                      MOVIS     209
    9 CONTINUE                                                          MOVIS     210
      WRITE (ITAPEW,FMT) R, (IPRINT(J), J= 1,NFB)                       MOVIS     211
  120 CONTINUE                                                          MOVIS     212
      KOUNT   =  LINES                                                  MOVIS     213
C                                                                       MOVIS     214
C                                                                       MOVIS     215
C     FORMATS                                                           MOVIS     216
C                                                                       MOVIS     217
 1000 FORMAT (    32HMODAL DEFLECTIONS     TIMES 1.0E,I3,10H, SURFACE=  MOVIS     218
     1          ,I2, 8H, MODE =,I3,14X)                                 MOVIS     219
 1100 FORMAT (    32HMODAL SLOPES (RAD/FT) TIMES 1.0E,I3,10H, SURFACE=  MOVIS     220
     1          ,I2, 8H, MODE =,I3,14X)                                 MOVIS     221
 2000 FORMAT (10X,32HMODAL DEFLECTIONS     TIMES 1.0E,I3,11H, SURFACE = MOVIS     222
     1          ,I2, 8H, MODE =,I3,/,10X,58(1H-))                       MOVIS     223
 2100 FORMAT (10X,32HMODAL SLOPES (RAD/FT) TIMES 1.0E,I3,11H, SURFACE = MOVIS     224
     1          ,I2, 8H, MODE =,I3,/,10X,58(1H-))                       MOVIS     225
CIBM                                                                    MOVIS     226
C3000 FORMAT (18A4)                                                      MOVIS     227
CIBM                                                                    MOVIS     228
```

```
            3000 FORMAT (7A10,1A2)                                                    MOVIS     230
  230       CCDC                                                                      MOVIS     231
            4000 FORMAT (10X,46                                                       MOVIS     232
                 1   HGRAPHICAL REPRESENTATION OF INTERPOLATED MODES./,10X,46(1H-))  MOVIS     233
            C                                                                         MOVIS     234
                 RETURN                                                               MOVIS     235
  235            END                                                                  MOVIS     236


CARD NR. SEVERITY  DETAILS   DIAGNOSIS OF PROBLEM

   103     I                AN IF STATEMENT MAY BE MORE EFFICIENT THAN A 2 OR 3 BRANCH COMPUTED GO TO STATEMENT.


        SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS      DEF LINE     REFERENCES
   3  MOVIS           2          234

VARIABLES       SN  TYPE             RELOCATION
 2076  BLANK        REAL      ARRAY                  REFS        23       180   DEFINED        32
  650  CMAX         REAL                             REFS     2*149   DEFINED       140
  642  D            REAL                             REFS      2*71      2*75   DEFINED        67
 1256  DEF          REAL      ARRAY                  REFS        21       199   DEFINED       100
  635  DL           REAL                             REFS        71        83      2*84   DEFINED        61        71        83
  631  DU           REAL                             REFS        75        84        86        87        90        91        96
                                                       97   DEFINED        57        75        84        90        96
 2143  FMT          REAL      ARRAY                  REFS        23       210   DEFINED       180       197
  641  I            INTEGER                          REFS        68        69        70        89        95     2*100       157
                                                  DEFINED        65        88        94        99       156
  654  IB1          INTEGER                          REFS       158       189   DEFINED       144       145
    0  ID           INTEGER              F.P.        REFS        39       103   DEFINED         2
  646  IEX          INTEGER                          REFS       100       101       102   DEFINED        85        89        95
                                                      101
  647  IEXX         INTEGER                          REFS       107       112       123       128   DEFINED       102
    0  IFB          INTEGER              F.P.        REFS        55        58        59        60        65       157       188
                                                  DEFINED         2
  630  IH           INTEGER                          REFS        66        67   DEFINED        56        66
  672  II           INTEGER                          REFS       188       199   DEFINED       187
  627  ILB          INTEGER                          REFS        65   DEFINED        55
    0  IM           INTEGER              F.P.        REFS        39       107       112       123       128
                                                  DEFINED         2
 1215  IPRINT       INTEGER   ARRAY                  REFS        20       210   DEFINED       199
    0  IS           INTEGER              F.P.        REFS        39       107       112       123       128
                                                  DEFINED         2
    2  ITAPEP       INTEGER              COMRWP      REFS        24
    0  ITAPER       INTEGER              COMRWP      REFS        24
    0  ITAPES       INTEGER   ARRAY      CTAPES      REFS        19        29        38
    7  ITAPET       INTEGER              CTABLE      REFS        27
    1  ITAPEW       INTEGER              COMRWP      REFS        24        41        43       111       113       127       129
                                                 I/O REFS        42       112       128       207       210
  626  ITAP18       INTEGER                       DEFINED        38  I/O REFS       106       107       108       109       122
```

```
VARIABLES      SN  TYPE            RELOCATION
                                               123      124      125
  660  IU          INTEGER                    REFS      161      165      166  DEFINED      153      165
  671  IX          INTEGER                    REFS      194      196      197  DEFINED      186      195
  673  IXL         INTEGER                    REFS      196  DEFINED      194
  661  IY          INTEGER                    REFS      172      175      204  DEFINED      155      173      174
  674  IYDIF       INTEGER                    REFS      205      206  DEFINED      204
  666  IYL         INTEGER                    REFS      175      204  DEFINED      172
  667  J           INTEGER                    REFS    2*180      189      190      195      210
                                           DEFINED      179      188      189      206      210
    7  KBPAGE      INTEGER          CLIST     REFS       25
    4  KLABEL      INTEGER          CLIST     REFS       25
  446  KLU         INTEGER                    REFS      174  DEFINED       33
    0  KLUE        INTEGER           F.P.     REFS      174  DEFINED        2
    0  KOUNT       INTEGER          CLIST     REFS       25       44      114      130  DEFINED       37       44
                                                50      114      130      212
   11  KOUNTH      INTEGER          CLIST     REFS       25
   12  KOUNTI      INTEGER          CLIST     REFS       25
    1  KPAGE       INTEGER          CLIST     REFS       25
    0  KTABLE      INTEGER          CTABLE    REFS       27  DEFINED       47      117      133
    5  KTABLO      INTEGER          CTABLE    REFS       27
    5  KTPAGE      INTEGER          CLIST     REFS       25
    2  LINES       INTEGER          CLIST     REFS       25       37       50      212
   10  LINESG      INTEGER          CLIST     REFS       25
    3  LINEST      INTEGER          CLIST     REFS       25
  662  MBOX        INTEGER                    REFS      158      159  DEFINED      157      158
    0  NBOXS       INTEGER           F.P.     REFS       20       55       99      156      187
                                           DEFINED        2
    3  NCOLS       INTEGER          CTABLE    REFS       27  DEFINED       46      116      132
    4  NCOLST      INTEGER          CTABLE    REFS       27
  670  NFB         INTEGER                    REFS      198      199      210  DEFINED      185      198
    6  NPAGE       INTEGER          CLIST     REFS       25
    6  NPAGEA      INTEGER          CTABLE    REFS       27
    1  NPASS       INTEGER          CTABLE    REFS       27
    2  NROWS       INTEGER          CTABLE    REFS       27  DEFINED       45      115      131
  656  NSB         INTEGER                    REFS      167  DEFINED      151      167
  664  NU          INTEGER                    REFS      162  DEFINED      161
  657  R           REAL                       REFS      160      173      174      190      210
                                           DEFINED      152      168
  665  RU          REAL                       REFS      163  DEFINED      162
  655  SCALE       REAL                       REFS      173      174      195  DEFINED      148      149
  653  SPAN        REAL                       REFS      148      149  DEFINED      143      147
  651  SY          REAL                       REFS      143      145      146      147  DEFINED      141
  652  SZ          REAL                       REFS      145      146    2*147  DEFINED      142
  675  TITLE       REAL    ARRAY              REFS       15      118      134  DEFINED      109      125
  445  WORD        REAL                       REFS      197  DEFINED       31
    0  X           REAL    ARRAY    MODV      REFS       18       58       68      195
    0  XI          REAL    ARRAY     F.P.     REFS       20       67      100  DEFINED        2
  636  XL          REAL                       REFS       72      140      195  DEFINED       62       72
  632  XU          REAL                       REFS       62       76      140  DEFINED       58       76
  643  X1          REAL                       REFS     2*72     2*76  DEFINED       68
  620  Y           REAL    ARRAY    MODV      REFS       18       30       59       69
  637  YL          REAL                       REFS       73      141      173  DEFINED       63       73      146
  663  YS          REAL                       REFS      160      163      166      168  DEFINED      159
  633  YU          REAL                       REFS       63       77      141      174  DEFINED       59       77
  705  YV          REAL    ARRAY              REFS       20      162  DEFINED      154      166
  620  YZ          REAL    ARRAY    MODV      REFS       22       30      159      190
  644  Y1          REAL                       REFS     2*73     2*77  DEFINED       69
```

```
VARIABLES      SN  TYPE            RELOCATION
  640  ZL          REAL                                 REFS        74        142        146   DEFINED       64         74
  634  ZU          REAL                                 REFS        64         78        142   DEFINED       60         78
 1440  ZZ          REAL         ARRAY     MODV          REFS        18         60         70
  645  Z1          REAL                                 REFS      2*74       2*78    DEFINED         70
       VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS              TYPE    ARGS        REFERENCES
       PLB                      3              41         43        111        113        127        129
       PTABLE                   3              48        118        134
       TITLES                   1              40        110        126

INLINE FUNCTIONS       TYPE    ARGS           DEF LINE   REFERENCES
       ABS          REAL        1  INTRIN                    83

STATEMENT LABELS                  DEF LINE    REFERENCES
    0  1                              79          65
  136  2                              94          86
  146  3                              99          87         91         93         97
    0  4                              92          88
    0  5                             180         179
    0  6                              98          94
    0  7                             207         206
  372  8                             200         187        190        196
  406  9                             209         205
    0  10                            100          99
    0  35          INACTIVE          198
   37  100                            51          39
  413  120                           211         156        160        163        175
    0  301                           164         161
  167  400                           105         103
  217  500                           121         103
  246  600                           136         103        119
  523  701      FMT                  208         207
  532  1000     FMT                  217         107
  543  1100     FMT                  219         123
  554  2000     FMT                  221         112
  566  2100     FMT                  223         128
  600  3000     FMT                  229         109        125
  602  4000     FMT                  231          42

LOOPS  LABEL      INDEX      FROM-TO      LENGTH     PROPERTIES
   57  1          I           65  79        35B         OPT
  127  4          I           88  92         7B       INSTACK     EXITS
  137  6          I           94  98         7B       INSTACK     EXITS
  147  10         I           99 100         6B                EXT REFS
  301  120        I          156 211       115B                EXT REFS   NOT INNER
  310  301        NU         161 164         6B       INSTACK     EXITS
  341  5          J          179 180         3B       INSTACK
  355  8          II         187 200        16B         OPT
  401  7          J          206 207         5B                EXT REFS

COMMON BLOCKS     LENGTH      MEMBERS - BIAS NAME(LENGTH)
       MODV         1200                0 X       (400)            400 Y       (400)            800 ZZ      (400)
       CTAPES         50                0 ITAPES (50)
       COMRWP          3                0 ITAPER  (1)               1 ITAPEW  (1)               2 ITAPEP  (1)
       CLIST          11                0 KOUNT   (1)               1 KPAGE   (1)               2 LINES   (1)
                                        3 LINEST  (1)               4 KLABEL  (1)               5 KTPAGE  (1)
```

```
      DO 360 I=2,NHTIC
  360 HLAB(I)=HLAB(I-1)+HEXTRA/HSCL
      WRITE (ITAPEW,800) BCDH,IHSCL
      WRITE (ITAPEW,810)(HLAB(LL),LL=1,NHTIC)
      DO 700 I=1,140
  700 B(I)=BLANK
      DO 710 I=1,NCELL,10
  710 B(I)=DOT
      WRITE (ITAPEW,841)(B(I),I=1,NCELL)
C     WRITE (ITAPEW,841) (B(I), I=1,NCELL)
      VNOW=VORG-.5*VPERL
      VLABT=VORG-.5*VPERL
      HORG=HORG-.5*HPERC
      K=1
      DO 1000 I=1,NLINE
      IVLAB=0
      NPOINT=0
      VNEXT=VNOW+VPERL
      IF (MOD(I-1,10).EQ.0) IVLAB=3
 1010 J=ITRANS(K)
      IF(NV GE.0) GO TO 1020
      GO TO 1120
 1020 IF(VVAL(J).GE.VNOW) GO TO 1040
      GO TO 1030
 1120 IF(VNOW.GE.VVAL(J)) GO TO 1140
      GO TO 1030
 1030 IF(K.GE.NDATA) GO TO 1300
      K=K+1
      GO TO 1010
 1040 IF(VNEXT.GE.VVAL(J)) GO TO 1050
      GO TO 1300
 1140 IF(VVAL(J).GE.VNEXT) GO TO 1050
      GO TO 1300
 1050 NPOINT=NPOINT+1
      IF(NPOINT.GE.100) GO TO 1300
      VTEMP(NPOINT)=VVAL(J)
      HTEMP(NPOINT)=HVAL(J)
      JSAVE(NPOINT)=J
      GO TO 1030
 1300 IF(NPOINT.LE.1) GO TO 1319
      NPT=NPOINT*NH
      CALL AORDER(HTEMP,NPT,IP,1)
      JJ=IP(1)
      JJ=IP(NPOINT)
      GO TO 1320
 1319 IP(1)=1
 1320 DO 1330 II=1,140
 1330 B(II)=BLANK
      IF(I-10)1400,1400,1410
 1410 IF(I-23)1420,1400,1400
 1420 ISYM=I-10
      ASYM=BCDV(ISYM)
      GO TO 1430
 1400 ASYM=BLANK
 1430 CONTINUE
      IF(IVLAB)1340,1340,1350
 1350 DO 1351 II=1,140,2
```

```
      SUBROUTINE PICTUR (VVAL,HVAL,NDATA,BCDV,BCDH,XCELL ,HON ,HTW ,XLIN PICTUR   2
     1E,VON,VTW,NPTS,NORD,ITRANS)                                      PICTUR   3
C                                                                      PICTUR   4
      DIMENSION        VVAL(1) ,       HVAL(1) ,       BCDV(1)         PICTUR   5
      DIMENSION       BCDH(12) ,       NPTS(1) ,     ITRANS(1)         PICTUR   6
      DIMENSION       PLTS(40) ,      HLAB(40)                         PI TUR   7
      DIMENSION         B(150) ,    HTEMP(100)                         PICTUR   8
      DIMENSION     VTEMP(100) ,    JSAVE(100) ,       IP(100)         PICTUR   9
      DIMENSION       MPTS(40) ,      BCDS(40)                         PICTUR  10
      DIMENSION ITAPES(50)                                             PICTUR  11
C                                                                      PICTUR  12
C                                                                      PICTUR  13
      COMMON / CTAPES / ITAPES                                         PICTUR  14
C                                                                      PICTUR  15
C                                                                      PICTUR  16
      DATA BLANK /1H / , DOT /1H./ , ASTRIC /1H*/                      PICTUR  17
      DATA  BCDS/1H1,1H2,1H3,1H4,1H5,1H6,1H7,1H8,1H9,1HA,              PICTUR  18
     1           1HB,1HC,1HD,1HE,1HF,1HG,1HH,1HI,1HJ,1HK,              PICTUR  19
     2           1HL,1HM,1HN,1HO,1HP,1HQ,1HR,1HS,1HT,1HU,              PICTUR  20
     3           1HV,1HW,1HX,1HY,1HZ,1H+,1H=,1H$,1H&,1H%/              PICTUR  21
      ITAPEW = ITAPES(6)                                               PICTUR  22
      HONE=HON                                                         PICTUR  23
      HTWO=HTW                                                         PICTUR  24
      VONE=VON                                                         PICTUR  25
      VTWO=VTW                                                         PICTUR  26
      NV=1                                                             PICTUR  27
      NH=1                                                             PICTUR  28
      MID = 40                                                         PICTUR  29
      DO 1 I=1,MID                                                     PICTUR  30
    1 MPTS(I)=NPTS(I)                                                  PICTUR  31
      DO 5 I=2,MID                                                     PICTUR  32
    5 MPTS(I)=MPTS(I)+MPTS(I-1)                                        PICTUR  33
      DO 8  I=1,MID                                                    PICTUR  34
    8 PLTS(I)=BCDS(I)                                                  PICTUR  35
    9 CONTINUE                                                         PICTUR  36
      IF(VONE.GT.VTWO)NV=-1                                            PICTUR  37
      IF(HONE.GT.HTWO)NH=-1                                            PICTUR  38
      IF(NORD.NE.1) GO TO 10                                           PICTUR  39
      NDAT=NV*NDATA                                                    PICTUR  40
      CALL AORDER(VVAL,NDAT,ITRANS,1)                                  PICTUR  41
   10 CONTINUE                                                         PICTUR  42
      XCON=SIGN(1.,XLINE )                                             PICTUR  43
      XLINES  =  ABS(XLINE)                                            PICTUR  44
      CALL SCLMAX(VVAL,NDATA,IVSCL,VONE,VTWO,XCON,NV)                  PICTUR  45
      CALL SCLINC(VONE,VTWO,XLINES,VEXTRA,VORG,0)                      PICTUR  46
      XCON=SIGN(1.,XCELL )                                             PICTUR  47
      XCELLS  =  ABS(XCELL)                                            PICTUR  48
      CALL SCLMAX(HVAL,NDATA,IHSCL,HONE,HTWO,XCON,NH)                  PICTUR  49
      CALL SCLINC(HONE,HTWO,XCELLS,HEXTRA,HORG,1)                      PICTUR  50
      NHTIC=.1*(XCELLS+1.)+1.                                          PICTUR  51
      HSCL=10.**IHSCL                                                  PICTUR  52
      VSCL=10.**IVSCL                                                  PICTUR  53
      HPERC=HEXTRA/10.                                                 PICTUR  54
      VPERL=VEXTRA/5.                                                  PICTUR  55
      NCELL=XCELLS+1.                                                  PICTUR  56
      NLINE=XLINES+1.                                                  PICTUR  57
      HLAB(1)=HORG/HSCL                                                PICTUR  58
```

```
LOOPS  LABEL  INDEX   FROM-TO   LENGTH   PROPERTIES
   12  5      I        25 27      13B                NOT INNER
   20  5      J        26 27       2B    INSTACK
   26  250    LL       28 120    277B                NOT INNER
   71  20     I        47 49       6B    INSTACK       EXITS
  137  200    K        68 116    151B                NOT INNER
  146  90     J        71 74       6B    INSTACK
  170  120    J        81 84       6B    INSTACK
  213  145    J        90 93      13B      OPT
  271  195    J       109 113     10B      OPT

COMMON BLOCKS   LENGTH    MEMBERS - BIAS NAME(LENGTH)
      CHSP          1               0 KDEG    (1)

STATISTICS
  PROGRAM LENGTH              431B     281
  CM LABELED COMMON LENGTH      1B       1
        52000B CM USED
```

```
VARIABLES       SN  TYPE            RELOCATION
    O  OPA          INTEGER              F.P.     REFS        11       29       39   DEFINED      1
  333  OPD          INTEGER                       REFS        11       31       52       55      76      79      97
                                                   100       102  DEFINED       29       41
    O  OPH          INTEGER              F.P.     REFS        11       56       75       85  DEFINED       1
  345  PROL         REAL                          REFS        73       77       83       99     101   2*103
                                               DEFINED        70       73
  346  PROLP        REAL                          REFS        83       86      103   DEFINED      80      83      95
                                                   114
    O  X            REAL        ARRAY    F.P.     REFS         4     2*35     2*37     2*38    2*43      46      48
                                                  3*73        83     2*92       99    2*111   2*112   2*118
                                               DEFINED         1

INLINE FUNCTIONS   TYPE    ARGS        DEF LINE   REFERENCES
       MINO        INTEGER    O  INTRIN                43

STATEMENT LABELS                 DEF LINE    REFERENCES
    O   5                           27          25      26
   63  10                           44          34      35      39      42
    O  15            INACTIVE       47          46
    O  20                           49          47      48
  101  25                           52          46      48
    O  30            INACTIVE       53        2*52
  106  40                           56          52    2*55
    O  45            INACTIVE       57        2*56
  115  55                           59          56
  120  60                           62          46
  122  65                           64          48
  127  70                           66          61
  134  75                           67          51      63
    O  80            INACTIVE       70          69
    O  85            INACTIVE       73        2*72
  153  90                           74          71      72
    O  95            INACTIVE       76          75
    O 100            INACTIVE       77        2*76
  164 110                           80          76    2*79    2*97
    O 115            INACTIVE       83        2*82
  175 120                           84          81      82
  200 125                           86          85      96     115
  206 135                           89        2*75     106
    O 140            INACTIVE       92        2*91
  225 145                           93          90      91
    O 150            INACTIVE       95        2*94
  232 155                           97          94
  233 160                           98        2*85      97
    O 165            INACTIVE      101       2*100
  250 170                          103         100   2*102
  257 175                          104         102
  260 180                          106        2*69
    O 185            INACTIVE      107       2*106
  300 195                          113         109     110
  305 200                          116          68      79      88     105
  322 250                          120          28      55     117     118
   54 300                           43          36
  310 350                          117          58
```

```
  115              GO TO 125                                                  HELGA      116
               200 CONTINUE                                                   HELGA      117
               350 IF (KDEG.NE.O) GOTO 250                                    HELGA      118
                   IF (ARC(LL).GE.X(1).AND.ARC(LL).LE.X(NX)) GOTO 250         HELGA      119
                   ANS(LL,1) = ANS(LL,1) + (ARC(LL)-ARG)*ANS(LL,2)            HELGA      120
  120          250 CONTINUE                                                   HELGA      121
                   RETURN                                                     HELGA      122
                   END                                                        HELGA      123


      SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS      DEF LINE      REFERENCES
   3  HELGA           1           121

VARIABLES      SN  TYPE             RELOCATION
  350  A           REAL                          REFS        99     103     112     114  DEFINED      98     107
                                                   112
    O  ANS         REAL      ARRAY      F.P.     REFS         4      77      86     101     103   2*119
                                               DEFINED        1      27      53      57      77      86     101
                                                   103      119
    O  ARC         REAL      ARRAY      F.P.     REFS         5      32   2*118     119  DEFINED       1
  337  ARG         REAL                          REFS      2*35      37      38    2*43      46      48      73
                                                    83       99     119  DEFINED      32      37      38
  351  B           REAL                          REFS       101     103     111     114  DEFINED      99     108
                                                   111
  332  DA          INTEGER                       REFS        11      57    2*86   2*103  DEFINED      30      31
                                                    40
    O  F           REAL      ARRAY      F.P.     REFS         5      53      57      77      86    2*98      99
                                               DEFINED        1
  347  HERLP       REAL                          REFS        92      95      98  DEFINED      89      92
  334  I           INTEGER                       REFS        27      48      53      57      60      64     106
                                                 2*112  DEFINED      25      45      47
  341  INC         INTEGER                       REFS        69      94  DEFINED      44      59
  335  J           INTEGER                       REFS        27      72    2*73      82      83      91      92
                                                   110      111   2*112  DEFINED      26      71      81      90
                                                   109
  343  K           INTEGER                       REFS      3*65    2*66      72      73      77      82      86
                                                    91       92    2*98    2*99     106     110     111
                                               DEFINED       60      64      65      68
    O  KDEG        INTEGER              CHSP     REFS         3      34      36     117
    O  L           INTEGER              F.P.     REFS        33  DEFINED       1
  336  LL          INTEGER                       REFS        32      53      57    2*77    2*86   2*101   2*103
                                                 2*118    4*119  DEFINED      28
  342  LS          INTEGER                       REFS        67      68      71      81      90     109
                                               DEFINED       50      62      66
  344  M           INTEGER                       REFS        68      71      81      90     109
                                               DEFINED       67
  340  N           INTEGER                       REFS        43      50      66      67  DEFINED      33      43
    O  NDF         INTEGER              F.P.     REFS         4  DEFINED       1
    O  NDX         INTEGER              F.P.     REFS         5  DEFINED       1
    O  NF          INTEGER              F.P.     REFS        26      28  DEFINED       1
    O  NX          INTEGER              F.P.     REFS        35    2*37      43      47      50      65      66
                                                   118  DEFINED       1
```

```
      GOTO 350                                                    HELGA    59
   55 INC=1                                                       HELGA    60
      K=I                                                         HELGA    61
      GO TO 70                                                    HELGA    62
   60 LS=1                                                        HELGA    63
      GO TO 75                                                    HELGA    64
   65 K=I                                                         HELGA    65
      IF(K+K.LE.NX+1) K=K-1                                       HELGA    66
   70 LS=K-((K-1)*(N+1))/NX                                       HELGA    67
   75 M=LS+N                                                      HELGA    68
      DO 200 K=LS,M                                               HELGA    69
      IF(INC)180,80,180                                           HELGA    70
   80 PROL=1.DO                                                   HELGA    71
      DO 90 J=LS,M                                                HELGA    72
      IF(K-J)85,90,85                                             HELGA    73
   85 PROL=(ARG-X(J))*(PROL/(X(K)-X(J)))                          HELGA    74
   90 CONTINUE                                                    HELGA    75
      IF(OPH)135,95,135                                           HELGA    76
   95 IF(OPD)110,100,100                                          HELGA    77
  100 ANS(LL,1) = PROL * F(K,1) + ANS(LL,1)                       HELGA    78
C                                                                 HELGA    79
      IF(OPD)110,200,110                                          HELGA    80
  110 PROLP=O.                                                    HELGA    81
      DO 120 J=LS,M                                               HELGA    82
      IF(K-J)115,120,115                                          HELGA    83
  115 PROLP=PROL/(ARG-X(J))+PROLP                                 HELGA    84
  120 CONTINUE                                                    HELGA    85
      IF(OPH)160,125,160                                          HELGA    86
  125 ANS(LL,DA) = PROLP * F(K,1) + ANS(LL,DA)                    HELGA    87
C                                                                 HELGA    88
      GO TO 200                                                   HELGA    89
  135 HERLP=O.                                                    HELGA    90
      DO 145 J=LS,M                                               HELGA    91
      IF(K-J)140,145,140                                          HELGA    92
  140 HERLP=1.DO/(X(K)-X(J))+HERLP                                HELGA    93
  145 CONTINUE                                                    HELGA    94
      IF(INC)150,155,150                                          HELGA    95
  150 PROLP=HERLP                                                 HELGA    96
      GO TO 125                                                   HELGA    97
  155 IF(OPD)110,160,110                                          HELGA    98
  160 A = F(K,2) - 2.0 * HERLP * F(K,1)                           HELGA    99
      B =(F(K,1) + A * (ARG - X(K))) * PROL                       HELGA   100
      IF(OPD)170,165,165                                          HELGA   101
  165 ANS(LL,1) = PROL * B + ANS(LL,1)                            HELGA   102
      IF(OPD)170,175,170                                          HELGA   103
  170 ANS(LL,DA) = 2.0 * PROLP * B + A * PROL * PROL + ANS (LL,DA) HELGA  104
  175 CONTINUE                                                    HELGA   105
      GO TO 200                                                   HELGA   106
  180 IF(K-I)185,135,185                                          HELGA   107
  185 A=1.DO                                                      HELGA   108
      B=1.DO                                                      HELGA   109
      DO 195 J=LS,M                                               HELGA   110
      IF(J.EQ.K)GO TO 195                                         HELGA   111
      B=(X(K)-X(J))*B                                             HELGA   112
      IF(J.NE.I)A=(X(I)-X(J))*A                                   HELGA   113
  195 CONTINUE                                                    HELGA   114
      PROLP=A/B                                                   HELGA   115
```

```
             SUBROUTINE HELGA (ARC,ANS,NF,NDF,X,F,NX,L,NDX,OPH,OPA)           HELGA       2
       C                                                                      HELGA       3
             COMMON /CHSP/ KDEG                                               HELGA       4
             DIMENSION     ANS(NDF,1) ,         X(1)                          HELGA       5
             DIMENSION       F(NDX,1) ,       ARC(1)                          HELGA       6
       C                                                                      HELGA       7
       CIBM  BEGINNING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS    HELGA       8
       C     DOUBLE PRECISION PROL,PROLP,HERLP,A,B                            HELGA       9
       CIBM  ENDING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS       HELGA      10
       C                                                                      HELGA      11
             INTEGER   DA , OPH , OPD , OPA                                   HELGA      12
       C     REVISED ROUTINE FOR ONE SET OF FUNCTIONS AND MULTIPLE ARGUMENTS  HELGA      13
       C     ARC      ARGUMENTS                                               HELGA      14
       C     ANS      DBL. DIM. ARRAY OF INTERPOLATION RESULTS                HELGA      15
       C     NF       NO. OF ARGUMENTS                                        HELGA      16
       C     NDF      DIMENSION FOR ARGUMENTS                                 HELGA      17
       C     X        ARRAY OF ARGUMENTS OF TABLES                            HELGA      18
       C     F        DBL. DIM. ARRAY OF GIVEN FUNCTION VALUES                HELGA      19
       C     NX       NO. OF VALUES IN TABLE                                  HELGA      20
       C     L        MAX. NO. VALUES USED FOR INTERPOLATION                  HELGA      21
       C     NDX      DIMENSION FOR TABLE                                     HELGA      22
       C     OPH      = 0 LAGRANGE ,  = 1 HERMITE                             HELGA      23
       C     OPD      = -1 DERIVATIVE , = 0 FUNCTION , = 1 BOTH               HELGA      24
       C                                                                      HELGA      25
             DO 5 I=1,2                                                       HELGA      26
             DO 5 J=1,NF                                                      HELGA      27
           5 ANS(J,I)=0.                                                      HELGA      28
             DO 250  LL = 1,NF                                                HELGA      29
             OPD = OPA                                                        HELGA      30
             DA  = 1                                                          HELGA      31
             IF (OPD.EQ.1) DA=2                                               HELGA      32
             ARG = ARC(LL)                                                    HELGA      33
                N  =  L  -  1                                                 HELGA      34
             IF (KDEG.GT.1) GO TO 10                                          HELGA      35
             IF ( ARG .GE. X(1) .AND. ARG .LE. X(NX) )  GO TO 10              HELGA      36
             IF  ( KDEG .EQ. 1 )        GO TO 300                             HELGA      37
             IF (ARG.GT.X(NX)) ARG=X(NX)                                      HELGA      38
             IF (ARG.LT.X(1))  ARG=X(1)                                       HELGA      39
             IF (OPA.LT.0)  GOTO 10                                           HELGA      40
             DA  = 2                                                          HELGA      41
             OPD = 1                                                          HELGA      42
                     GO TO 10                                                 HELGA      43
         300 IF ( ARG .LT. X(1) .OR. ARG .GT. X(NX) )  N = MINO (2,N)         HELGA      44
          10 INC=0                                                            HELGA      45
             I=1                                                              HELGA      46
             IF(ARG-X(1))60,25,15                                             HELGA      47
          15 DO 20 I=2,NX                                                     HELGA      48
             IF(ARG-X(I))65,25,20                                             HELGA      49
          20 CONTINUE                                                         HELGA      50
             LS=NX-N                                                          HELGA      51
             GO TO 75                                                         HELGA      52
          25 IF(OPD)40,30,30                                                  HELGA      53
          30 ANS(LL,1) = F(I,1)                                               HELGA      54
       C                                                                      HELGA      55
             IF(OPD)40,250,40                                                 HELGA      56
          40 IF(OPH)45,55,45                                                  HELGA      57
```

```
VARIABLES      SN  TYPE           RELOCATION
    0  NGPI       INTEGER               F.P.       REFS      25   DEFINED        1        24
    0  NGPTOT     INTEGER               F.P.       REFS      12   DEFINED        1        12
   63  NLIN       INTEGER                          REFS      17        18  DEFINED        13
    0  NLINES     INTEGER               F.P.       REFS      13        14  DEFINED         1        14
    0  XGP        REAL       ARRAY      F.P.       REFS       5        26  DEFINED         1        26
    0  XTERM1     REAL       ARRAY    JUNK         REFS       2         4       20  DEFINED        20
   24  XTERM2     REAL       ARRAY    JUNK         REFS       2         4       21  DEFINED        21
    0  YGP        REAL       ARRAY      F.P.       REFS       5        27  DEFINED         1        27
   50  YTERM1     REAL       ARRAY    JUNK         REFS       2         4       22  DEFINED        22
   74  YTERM2     REAL       ARRAY    JUNK         REFS       2         4       23  DEFINED        23
       VARIABLES USED AS FILE NAMES, SEE ABOVE

STATEMENT LABELS               DEF LINE   REFERENCES
    0  40                         28         17
   60  60        FMT              33         15
    0  80                         27         25

LOOPS  LABEL     INDEX       FROM-TO     LENGTH    PROPERTIES
   16  40        I            17 28        34B                NOT INNER
   43  80        J            25 27         4B       INSTACK

COMMON BLOCKS    LENGTH      MEMBERS - BIAS NAME(LENGTH)
       JUNK          81                 0 XTERM1 (20)           20 XTERM2 (20)            40 YTERM1 (20)
                                       60 YTERM2 (20)           80 DIST   (1)

       CTAPES        50                 0 ITAPES (50)

STATISTICS
  PROGRAM LENGTH                 100B       64
  CM LABELED COMMON LENGTH       203B      131
         52000B CM USED
```

```
      SUBROUTINE FORM (NLINES,KEL,NGPTOT,NGPI,XGP,YGP,NGP)              FORM   2
      COMMON/JUNK/XTERM1,XTERM2,YTERM1,YTERM2,DIST                      FORM   3
      COMMON / CTAPES / ITAPES                                          FORM   4
      DIMENSION  XTERM1(20), XTERM2(20), YTERM1(20), YTERM2(20)         FORM   5
      DIMENSION  XGP(12,20), YGP(12,20), NGP(20)                        FORM   6
      DIMENSION ITAPES(50)                                              FORM   7
C                                                                       FORM   8
C                                                                       FORM   9
      ITAPER = ITAPES(5)                                                FORM  10
C                                                                       FORM  11
C                                                                       FORM  12
      NGPTOT = 2*NGPTOT                                                 FORM  13
      NLIN = NLINES                                                     FORM  14
      NLINES = 2*NLINES                                                 FORM  15
      READ (ITAPER,60) DIST                                             FORM  16
      KEL=1                                                             FORM  17
      DO 40 I=1,NLIN                                                    FORM  18
      IJ = I + NLIN                                                     FORM  19
      NGP(IJ) = NGP(I)                                                  FORM  20
      XTERM1(IJ) = XTERM1(I) + DIST                                     FORM  21
      XTERM2(IJ) = XTERM2(I) + DIST                                     FORM  22
      YTERM1(IJ) = YTERM1(I)                                            FORM  23
      YTERM2(IJ) = YTERM2(I)                                            FORM  24
      NGPI = NGP(I)                                                     FORM  25
      DO 80 J=1,NGPI                                                    FORM  26
      XGP(J,IJ) = XGP(J,I) + DIST                                       FORM  27
   80 YGP(J,IJ) = YGP(J,I)                                              FORM  28
   40 CONTINUE                                                          FORM  29
C                                                                       FORM  30
C                                                                       FORM  31
C FORMATS                                                               FORM  32
C                                                                       FORM  33
   60 FORMAT(E10.2)                                                     FORM  34
C                                                                       FORM  35
      RETURN                                                            FORM  36
      END                                                               FORM  37
```

```
    SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS     DEF LINE     REFERENCES
    3  FORM          1           35

VARIABLES     SN  TYPE            RELOCATION
  120  DIST       REAL                  JUNK     REFS       2      20      21      26   DEFINED      15
   64  I          INTEGER                        REFS      18      19      20      21       22      23      24
                                                   26      27 DEFINED      17
   65  IJ         INTEGER                        REFS      19      20      21      22       23      26      27
                                              DEFINED      18
   62  ITAPER     INTEGER                     DEFINED       9 I/O REFS     15
    O  ITAPES     INTEGER   ARRAY    CTAPES      REFS       3       6       9
   66  J          INTEGER                        REFS    2*26    2*27 DEFINED      25
    O  KEL        INTEGER             F.P.    DEFINED       1      16
    O  NGP        INTEGER   ARRAY     F.P.       REFS       5      19      24 DEFINED        1      19
```

```
STATEMENT LABELS                  DEF LINE   REFERENCES
  150  90                            49         46       47
    0  95          INACTIVE          51         50
    0  100         INACTIVE          52         2*51
    0  105                           53         52
  170  110                           55         51       2*54      2*72
    0  115         INACTIVE          58         2*57
  201  120                           59         56       57
  204  125                           61         60       71        93
    0  130                           62         61
  221  135                           64         2*50     84
    0  140         INACTIVE          67         2*66
  233  145                           68         65       66
    0  150         INACTIVE          70         2*69
  240  155                           72         69
  241  160                           73         2*60     72
    0  165         INACTIVE          79         2*78
  274  170                           81         78       2*80
  301  175                           82         74       80
  304  180                           84         2*44
    0  185         INACTIVE          85         2*84
  324  195                           91         87       88
  331  200                           94         43       54        63        83
  334  250                           95         27       33

LOOPS  LABEL    INDEX      FROM-TO    LENGTH    PROPERTIES
   17  5        I            13 15      13B               NOT INNER
   25  5        J            14 15       2B       INSTACK
   40  20       I            19 21       6B       INSTACK    EXITS
   61  35       J            25 26       2B       INSTACK
  104  50       J            30 32       4B       INSTACK
  134  200      K            43 94     200B               NOT INNER
  143  90       J            46 43       6B       INSTACK
  162  105      J            52 53       4B       INSTACK
  174  120      J            56 59       6B       INSTACK
  214  130      J            61 62       4B       INSTACK
  226  145      J            65 68       6B       INSTACK
  262  175      J            74 82      21B         OPT
  315  195      J            87 91      10B         OPT

STATISTICS
  PROGRAM LENGTH                 423B      275
          52000B CM USED
```

```
VARIABLES      SN  TYPE           RELOCATION
  361  B           REAL                          REFS        79        81        89        92   DEFINED        77        86
                                                   89
  344  DA          INTEGER                       REFS         9        13        32      2*62      2*81
                                              DEFINED        11        12
    0  F           REAL         ARRAY     F.P.   REFS         8        26        32        53        62      2*76        77
                                              DEFINED         1
  357  HERLP       REAL                          REFS        67        70        76   DEFINED        64        67
  346  I           INTEGER                       REFS        15        20        26        32        35        39        84
                                                 2*90   DEFINED        13        17        19
  350  INC         INTEGER                       REFS        44        69   DEFINED        16        34
  347  J           INTEGER                       REFS        15      2*26        32        47      2*48      3*53        57
                                                   58      3*62        66        67        76        77      2*79      2*81
                                                   88        89      2*90   DEFINED        14        25        30        46
                                                   52        56        61        65        74        87
  352  JJ          INTEGER                       REFS        31        32        75        76   DEFINED        29        31
                                                   73        75
  353  K           INTEGER                       REFS      3*40      2*41        47        48        53        57        62
                                                   66        67      2*76      2*77        84        88        89
                                              DEFINED        35        39        40        43
    0  L           INTEGER                F.P.   REFS        10   DEFINED         1
  351  LS          INTEGER                       REFS        42        43        46        56        65        87
                                              DEFINED        22        37        41
  354  M           INTEGER                       REFS        43        46        56        65        87
                                              DEFINED        42
  345  N           INTEGER                       REFS        22        41        42   DEFINED        10
    0  NDF         INTEGER                F.P.   REFS         8   DEFINED         1
    0  NDX         INTEGER                F.P.   REFS         8   DEFINED         1
    0  NF          INTEGER                F.P.   REFS        14        25        29        30        52        61        73
                                                   74   DEFINED         1
    0  NX          INTEGER                F.P.   REFS        19        22        40        41   DEFINED         1
    0  OPD         INTEGER                F.P.   REFS         9        12        24        27        51        54        72
                                                   78        80   DEFINED         1
    0  OPH         INTEGER                F.P.   REFS         9        28        50        60   DEFINED         1
  355  PROL        REAL                          REFS        48        53        58        77        79      2*81
                                              DEFINED        45        48
  356  PROLP       REAL                          REFS        58        62        81   DEFINED        55        58        70
                                                   92
    0  X           REAL         ARRAY     F.P.   REFS         8        18        20      3*48        58      2*67        77
                                                 2*89      2*90   DEFINED         1

STATEMENT LABELS             DEF LINE   REFERENCES
    0  5                        15         13        14
    0  15        INACTIVE       19         18
    0  20                       21         19        20
   50  25                       24         18        20
    0  30        INACTIVE       25       2*24
    0  35                       26         25
   66  40                       28         24      2*27
    0  45        INACTIVE       29       2*28
    0  50                       32         30
  111  55                       34         28
  114  60                       37         18
  116  65                       39         20
  123  70                       41         36
  131  75                       42         23        38
    0  80        INACTIVE       45         44
    0  85        INACTIVE     [illegible]  [illegible]
```

```
  115 PROLP=PROL/(ARG-X(J))+PROLP                         HELGX    59
  120 CONTINUE                                            HELGX    60
      IF(OPH)160,125,160                                  HELGX    61
  125 DO 130 J=1,NF                                       HELGX    62
  130 ANS(J,DA)=PROLP*F(K,J)+ANS(J,DA)                    HELGX    63
      GO TO 200                                           HELGX    64
  135 HERLP=0.                                            HELGX    65
      DO 145 J=LS,M                                       HELGX    66
      IF(K-J)140,145,140                                  HELGX    67
  140 HERLP = 1. /(X(K)-X(J)) + HERLP                     HELGX    68
  145 CONTINUE                                            HELGX    69
      IF(INC)150,155,150                                  HELGX    70
  150 PROLP=HERLP                                         HELGX    71
      GO TO 125                                           HELGX    72
  155 IF(OPD)110,160,110                                  HELGX    73
  160 JJ=NF                                               HELGX    74
      DO 175 J=1,NF                                       HELGX    75
      JJ=JJ+1                                             HELGX    76
      A=F(K,JJ)-2.*HERLP*F(K,J)                           HELGX    77
      B=(F(K,J)+A*(ARG-X(K)))*PROL                        HELGX    78
      IF(OPD)170,165,165                                  HELGX    79
  165 ANS(J,1)=PROL*B+ANS(J,1)                            HELGX    80
      IF(OPD)170,175,170                                  HELGX    81
  170 ANS(J,DA)=2.*PROLP*B+A*PROL*PROL+ANS(J,DA)          HELGX    82
  175 CONTINUE                                            HELGX    83
      GO TO 200                                           HELGX    84
  180 IF(K-I)185,135,185                                  HELGX    85
  185 A = 1.                                              HELGX    86
      B  = 1.                                             HELGX    87
      DO 195 J=LS,M                                       HELGX    88
      IF(J.EQ.K)GO TO 195                                 HELGX    89
      B=(X(K)-X(J))*B                                     HELGX    90
      IF(J.NE.I)A=(X(I)-X(J))*A                           HELGX    91
  195 CONTINUE                                            HELGX    92
      PROLP=A/B                                           HELGX    93
      GO TO 125                                           HELGX    94
  200 CONTINUE                                            HELGX    95
  250 RETURN                                              HELGX    96
      END                                                 HELGX    97
```

SYMBOLIC REFERENCE MAP (R=3)

```
ENTRY POINTS      DEF LINE      REFERENCES
    3  HELGX          1            95

VARIABLES      SN  TYPE          RELOCATION
  360  A           REAL                              REFS        77      81      90      92   DEFINED      76      85
                                                       90
    0  ANS         REAL         ARRAY     F.P.       REFS         8      53      62      79       81
                                                  DEFINED         1      15      26      32       53      62      79
                                                       81
    0  ARG         REAL                   F.P.       REFS        18      20      48      58       77
                                                  DEFINED         1
```

```
      SUBROUTINE HELGX( ARG  ,ANS,X,F, NX , NF , L , NDF , NDX , OPH , OP HELGX
     1D )                                                                HELGX
C                                                                        HELGX
CIBM  BEGINNING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS      HELGX
C     DOUBLE PRECISION PROL   ,PROLP ,HERLP ,A       ,B                  HELGX
CIBM  ENDING OF STATEMENTS ASSOCIATED WITH IBM COMPUTER PROGRAMS         HELGX
C                                                                        HELGX
      DIMENSION ANS(NDF,1),X(1),F(NDX,1)                                 HELGX
      INTEGER DA,OPH,OPD                                                 HELGX
      N=L-1                                                              HELGX
      DA=1                                                               HELGX
      IF(OPD.EQ.1)DA=2                                                   HELGX
      DO 5 I=1,DA                                                        HELGX
      DO 5 J=1,NF                                                        HELGX
    5 ANS(J,I)=0.                                                        HELGX
      INC  =  0                                                          HELGX
      I=1                                                                HELGX
      IF(ARG-X(1))60,25,15                                               HELGX
   15 DO 20 I=2,NX                                                       HELGX
      IF(ARG-X(I))65,25,20                                               HELGX
   20 CONTINUE                                                           HELGX
      LS=NX-N                                                            HELGX
      GO TO 75                                                           HELGX
   25 IF(OPD)40,30,30                                                    HELGX
   30 DO 35 J=1,NF                                                       HELGX
   35 ANS(J,1)=F(I,J)                                                    HELGX
      IF(OPD)40,250,40                                                   HELGX
   40 IF(OPH)45,55,45                                                    HELGX
   45 JJ=NF                                                              HELGX
      DO 50 J=1,NF                                                       HELGX
      JJ=JJ+1                                                            HELGX
   50 ANS(J,DA)=F(I,JJ)                                                  HELGX
      GO TO 250                                                          HELGX
   55 INC=1                                                              HELGX
      K=I                                                                HELGX
      GO TO 70                                                           HELGX
   60 LS=1                                                               HELGX
      GO TO 75                                                           HELGX
   65 K=I                                                                HELGX
      IF(K+K.LE.NX+1) K=K-1                                              HELGX
   70 LS=K-((K-1)*(N+1))/NX                                              HELGX
   75 M=LS+N                                                             HELGX
      DO 200 K=LS,M                                                      HELGX
      IF(INC)180,80,180                                                  HELGX
   80 PROL  =  1.                                                        HELGX
      DO 90 J=LS,M                                                       HELGX
      IF(K-J)85,90,85                                                    HELGX
   85 PROL=(ARG-X(J))*(PROL/(X(K)-X(J)))                                 HELGX
   90 CONTINUE                                                           HELGX
      IF(OPH)135,95,135                                                  HELGX
   95 IF(OPD)110,100,100                                                 HELGX
  100 DO 105 J=1,NF                                                      HELGX
  105 ANS(J,1)=PROL*F(K,J)+ANS(J,1)                                      HELGX
      IF(OPD)110,200,110                                                 HELGX
  110 PROLP=0.                                                           HELGX
      DO 120 J=LS,M                                                      HELGX
      IF(K-J)115,120,115                                                 HELGX
```

```
 COMMON BLOCKS   LENGTH     MEMBERS - BIAS NAME(LENGTH)
                                      6 NPAGE  (1)          7 KBPAGE (1)          8 LINESG (1)
                                      9 KOUNTH (1)         10 KOUNTI (1)
       CTABLE         8               0 KTABLE (1)          1 NPASS  (1)          2 NROWS  (1)
                                      3 NCOLS  (1)          4 NCOLST (1)          5 KTABLO (1)
                                      6 NPAGEA (1)          7 ITAPET (1)

 EQUIV CLASSES   LENGTH     MEMBERS - BIAS NAME(LENGTH)
X       Y           800               0 YZ     (800)      400 ZZ     (400)

 STATISTICS
   PROGRAM LENGTH                2226B     1174
   CM LABELED COMMON LENGTH      2370B     1272
        52000B CM USED
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```
 1351 B(II)=DOT                                                      PICTUR    116
      VLAB=(VLABT+.5*VPERL)/VSCL                                     PICTUR    117
      VLABT=VLABT+10.*VPERL                                          PICTUR    118
      GO TO 1342                                                     PICTUR    119
 1340 DO 1341  II=1,140,20                                           PICTUR    120
 1341 B(II)=DOT                                                      PICTUR    121
 1342 CONTINUE                                                       PICTUR    122
      IF(NPOINT-1) 890,1380,1360                                     PICTUR    123
  890 IPRIT=1                                                        PICTUR    124
      GO TO 1890                                                     PICTUR    125
 1360 VVALV=0.                                                       PICTUR    126
      IPRIT=3                                                        PICTUR    127
      FPT=NPOINT                                                     PICTUR    128
      DO 1370 II=1,NPOINT                                            PICTUR    129
 1370 VVALV=VVALV+VTEMP(II)                                          PICTUR    130
      VVALV=VVALV/(VSCL*FPT)                                         PICTUR    131
      GO TO 860                                                      PICTUR    132
 1380 VVALV=VTEMP(1)/VSCL                                            PICTUR    133
      IPRIT=2                                                        PICTUR    134
  860 CONTINUE                                                       PICTUR    135
      BSYMO=BCDS(MID)                                                PICTUR    136
      JPTO=-1                                                        PICTUR    137
      DO 2500 II=1,NPOINT                                            PICTUR    138
      JJ=IP(II)                                                      PICTUR    139
      JJJ=JSAVE(JJ)                                                  PICTUR    140
      FJPT=(HTEMP(JJ)-HORG)/HPERC                                    PICTUR    141
      IF(FJPT.LT.O.) GO TO 2500                                      PICTUR    142
      IF(FJPT.GT.(XCELLS+2.)) GO TO 2500                             PICTUR    143
      JPT=FJPT+1.                                                    PICTUR    144
      IF(JPT.GE.102) GO TO 2500                                      PICTUR    145
      DO 2540 III=1,MID                                              PICTUR    146
      IF(MPTS(III).GE.JJJ) GO TO 2541                                PICTUR    147
 2540 CONTINUE                                                       PICTUR    148
      III=5                                                          PICTUR    149
 2541 BSYM=PLTS(III)                                                 PICTUR    150
      IF(JPT.NE.JPTO) GO TO 2550                                     PICTUR    151
      IF(BSYM.NE.BSYMO) BSYM=ASTRIC                                  PICTUR    152
 2550 BSYMO=BSYM                                                     PICTUR    153
      JPTO=JPT                                                       PICTUR    154
      B(JPT)=BSYM                                                    PICTUR    155
 2500 CONTINUE                                                       PICTUR    156
 1890 IFORM=IVLAB+IPRIT                                              PICTUR    157
      GO TO (1500,1500,1500,1800,1800,1800),IFORM                    PICTUR    158
 1500 WRITE (ITAPEW,1501)       ASYM,(B(LL),LL=1,NCELL)              PICTUR    159
      GO TO 2100                                                     PICTUR    160
 1800 WRITE (ITAPEW,1801)ASYM,VLAB,IVSCL,(B(LL),LL=1,NCELL)          PICTUR    161
 2100 CONTINUE                                                       PICTUR    162
      VNOW=VNEXT                                                     PICTUR    163
 1000 CONTINUE                                                       PICTUR    164
C                                                                    PICTUR    165
C                                                                    PICTUR    166
C FORMATS                                                            PICTUR    167
C                                                                    PICTUR    168
  800 FORMAT(43X,12A1,2X,3H(/EI3,1H))                                PICTUR    169
  810 FORMAT (11X,11(4X,F6.2))                                       PICTUR    170
  841 FORMAT(18X,102A1)                                              PICTUR    171
 1501 FORMAT (2X,A1,11X,102A1)                                       PICTUR    172
```

```
              1801 FORMAT (3X,A1,1X,F6.2,2H EI3,2H..,102A1)                        PICTUR     173
             C                                                                      PICTUR     174
                    RETURN                                                          PICTUR     175
   175              END                                                             PICTUR     176


      SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS      DEF LINE      REFERENCES
    3  PICTUR         1           174

VARIABLES     SN  TYPE            RELOCATION
   526  ASTRIC     REAL                              REFS      151   DEFINED        16
   656  ASYM       REAL                              REFS      158       160   DEFINED       109       111
  1013  B          REAL        ARRAY                 REFS        7        66       158       160   DEFINED        63        65
                                                      105      115       120       154
     O  BCDH       REAL        ARRAY      F.P.       REFS        5        60   DEFINED         1
  2131  BCDS       REAL        ARRAY                 REFS        9        34       135   DEFINED        17
     O  BCDV       REAL        ARRAY      F.P.       REFS        4       109   DEFINED         1
   524  BLANK      REAL                              REFS       63       105       111   DEFINED        16
   671  BSYM       REAL                              REFS      151       152       154   DEFINED       149       151
   663  BSYMO      REAL                              REFS      151   DEFINED       135       152
   525  DOT        REAL                              REFS       65       115       120   DEFINED        16
   666  FJPT       REAL                              REFS      141       142       143   DEFINED       140
   662  FPT        REAL                              REFS      130   DEFINED       127
   631  HEXTRA     REAL                              REFS       49        53        59
   743  HLAB       REAL        ARRAY                 REFS        6        59        61   DEFINED        57        59
     O  HON        REAL                   F.P.       REFS       22   DEFINED         1
   611  HONE       REAL                              REFS       37        48        49   DEFINED        22
   632  HORG       REAL                              REFS       49        57        70       140   DEFINED        70
   636  HPERC      REAL                              REFS       70       140   DEFINED        53
   634  HSCL       REAL                              REFS       57        59   DEFINED        51
  1241  HTEMP      REAL        ARRAY                 REFS        7        99       140   DEFINED        94
     O  HTW        REAL                   F.P.       REFS       23   DEFINED         1
   612  HTWO       REAL                              REFS       37        48        49   DEFINED        23
     O  HVAL       REAL        ARRAY      F.P.       REFS        4        48        94   DEFINED         1
   620  I          INTEGER                           REFS     2*30      3*32      2*34      2*59        63        65        66
                                                       76      106       107       108   DEFINED        29        31        33
                                                       58       62        64        66        72
   672  IFORM      INTEGER                           REFS      157   DEFINED       156
   630  IHSCL      INTEGER                           REFS       48        51        60
   654  II         INTEGER                           REFS      105       115       120       129       138
                                                  DEFINED      104       114       119       128       137
   670  III        INTEGER                           REFS      146       149   DEFINED       145       148
  1715  IP         INTEGER     ARRAY                 REFS        8        99       100       101       138
                                                  DEFINED      103
   660  IPRIT      INTEGER                           REFS      156   DEFINED       123       126       133
   655  ISYM       INTEGER                           REFS      109   DEFINED       108
     O  ITAPES     INTEGER     ARRAY      CTAPES     REFS       10        13        21
   610  ITAPEW     INTEGER                        DEFINED       21  I/O REFS        60        61        66       158       160
     O  ITRANS     INTEGER     ARRAY      F.P.       REFS        5        40        77   DEFINED         1
   646  IVLAB      INTEGER                           REFS      113       156   DEFINED        73        76
   624  IVSCL      INTEGER                           REFS       44        52       160
   651  J          INTEGER                           REFS       80        82        87        89        93        94        95
```

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VARIABLES      SN  TYPE            RELOCATION
                                             DEFINED     77
  653  JJ          INTEGER                     REFS     139       140   DEFINED       100       101       138
  665  JJJ         INTEGER                     REFS     146   DEFINED       139
  667  JPT         INTEGER                     REFS     144       150       153       154   DEFINED       143
  664  JPTO        INTEGER                     REFS     150   DEFINED       136       153
 1551  JSAVE       INTEGER    ARRAY            REFS       8       139   DEFINED        95
  645  K           INTEGER                     REFS      77        84        85   DEFINED        71        85
  642  LL          INTEGER                     REFS      61       158       160   DEFINED        61       158       160
  617  MID         INTEGER                     REFS      29        31        33       135       145
                                             DEFINED     28
 2061  MPTS        INTEGER    ARRAY            REFS       9      2*32       146   DEFINED        30        32
  640  NCELL       INTEGER                     REFS      64        66       158       160   DEFINED        55
  621  NDAT        INTEGER                     REFS      40   DEFINED        39
    0  NDATA       INTEGER          F.P.       REFS      39        44        48        84   DEFINED         1
  616  NH          INTEGER                     REFS      48        98   DEFINED        27        37
  633  NHTIC       INTEGER                     REFS      58        61   DEFINED        50
  641  NLINE       INTEGER                     REFS      72   DEFINED        56
    0  NORD        INTEGER          F.P.       REFS      38   DEFINED         1
  647  NPOINT      INTEGER                     REFS      91        92        93        94        95        97        98
                                                101     122       127       128       137   DEFINED        74        91
  652  NPT         INTEGER                     REFS      99   DEFINED        98
    0  NPTS        INTEGER    ARRAY F.P.       REFS       5        30   DEFINED         1
  615  NV          INTEGER                     REFS      39        44        78   DEFINED        26        36
  673  PLTS        REAL       ARRAY            REFS       6       149   DEFINED        34
  625  VEXTRA      REAL                        REFS      45        54
  657  VLAB        REAL                        REFS     160   DEFINED       116
  644  VLABT       REAL                        REFS     116       117   DEFINED        69       117
  650  VNEXT       REAL                        REFS      87        89       162   DEFINED        75
  643  VNOW        REAL                        REFS      75        80        82   DEFINED        68       162
    0  VON         REAL             F.P.       REFS      24   DEFINED         1
  613  VONE        REAL                        REFS      36        44        45   DEFINED        24
  626  VORG        REAL                        REFS      45        68        69
  637  VPERL       REAL                        REFS      68        69        75       116       117
                                             DEFINED     54
  635  VSCL        REAL                        REFS     116       130       132   DEFINED        52
 1405  VTEMP       REAL       ARRAY            REFS       8       129       132   DEFINED        93
    0  VTW         REAL             F.P.       REFS      25   DEFINED         1
  614  VTWO        REAL                        REFS      36        44        45   DEFINED        25
    0  VVAL        REAL       ARRAY F.P.       REFS       4        40        44        80        82        87        89
                                                 93 DEFINED         1
  661  VVALV       REAL                        REFS     129       130   DEFINED       125       129       130       132
    0  XCELL       REAL             F.P.       REFS      46        47   DEFINED         1
  627  XCELLS      REAL                        REFS      49        50        55       142   DEFINED        47
  622  XCON        REAL                        REFS      44        48   DEFINED        42        46
    0  XLINE       REAL             F.P.       REFS      42        43   DEFINED         1
  623  XLINES      REAL                        REFS      45        56   DEFINED        43
       VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS          TYPE   ARGS        REFERENCES
       AORDER               4             40       99
       SCLINC               6             45       49
       SCLMAX               7             44       48

INLINE FUNCTIONS   TYPE   ARGS         DEF LINE  REFERENCES
       ABS         REAL     1  INTRIN              43       47
       MOD         INTEGER  2  INTRIN              76
       SIGN        REAL     2  INTRIN              42       46
```

```
STATEMENT LABELS                  DEF LINE   REFERENCES
     0  1                            30         29
     0  5                            32         31
     0  8                            34         33
     0  9              INACTIVE      35
    62  10                           41         38
     0  360                          59         58
     0  700                          63         62
     0  710                          65         64
   560  800      FMT                168         60
   564  810      FMT                169         61
   567  841      FMT                170         66
   352  860                         134        131
     0  890            INACTIVE     123        122
     0  1000                        163         72
   214  1010                         77         86
   220  1020                         80         78
   226  1030                         84         81         83         96
   232  1040                         87         80
   240  1050                         91         87         89
   223  1120                         82         79
   235  1140                         89         82
   250  1300                         97         84         88         90         92
   261  1319                        103         97
   262  1320                        104        102
     0  1330                        105        104
   316  1340                        119       2*113
     0  1341                        120        119
   325  1342                        121        118
     0  1350            INACTIVE    114        113
     0  1351                        115        114
   331  1360                        125        122
     0  1370                        129        128
   347  1380                        132        122
   277  1400                        111       2*106      2*107
     0  1410            INACTIVE    107        106
     0  1420            INACTIVE    108        107
   301  1430                        112        110
   433  1500                        158       3*157
   571  1501     FMT                171        158
   441  1800                        160       3*157
   574  1801     FMT                172        160
   417  1890                        156        124
   446  2100                        161        159
   414  2500                        155        137        141        142        144
     0  2540                        147        145
   403  2541                        149        146
   411  2550                        152        150

LOOPS  LABEL     INDEX      FROM-TO     LENGTH   PROPERTIES
   24  1         I           29  30        2B     INSTACK
   32  5         I           31  32        3B     INSTACK
   40  8         I           33  34        3B     INSTACK
  136  360       I           58  59        3B     INSTACK
  154  700       I           62  63        3B     INSTACK
  162  710       I           64  65        3B     INSTACK
  203  1000      I           72 163      247B              EXT REFS  NOT INNER
```

```
LOOPS  LABEL     INDEX      FROM-TO     LENGTH    PROPERTIES
  265  1330      II          104 105        3B     INSTACK
  305  1351      II          114 115        3B     INSTACK
  321  1341      II          119 120        3B     INSTACK
  340  1370      II          128 129        3B     INSTACK
  356  2500      II          137 155       41B               NOT INNER
  374  2540      III         145 147        6B     INSTACK     EXITS

COMMON BLOCKS    LENGTH     MEMBERS - BIAS NAME(LENGTH)
       CTAPES        50                 0 ITAPES (50)

STATISTICS
  PROGRAM LENGTH                 2213B     1163
  CM LABELED COMMON LENGTH         62B       50
          52000B CM USED
```

```
            SUBROUTINE AORDER (A,N,IPERM,NCON)                               AORDER      2
      C                                                                      AORDER      3
            DIMENSION A(1),IPERM(1)                                          AORDER      4
            K = 1                                                            AORDER      5
            M1 = IABS(N)                                                     AORDER      6
            DO 10 I=1,M1                                                     AORDER      7
         10 IPERM(I)=I                                                       AORDER      8
        100 L = K                                                            AORDER      9
            K = K + 1                                                        AORDER     10
            IF (K - M1) 110,110,170                                          AORDER     11
        110 DO 140  I = 1,L                                                  AORDER     12
            INDI=IPERM(I)                                                    AORDER     13
            IF(NCON)180,180,200                                              AORDER     14
        180 IF(N)120,170,130                                                 AORDER     15
        120 IF(A(K)-A(I))140,140,150                                         AORDER     16
        130 IF (A(K) - A(I)) 150,140,140                                     AORDER     17
        200 IF(N)220,270,230                                                 AORDER     18
        220 IF(A(K)    .GT.A(INDI)) GO TO 250                                AORDER     19
            GO TO 140                                                        AORDER     20
        230 IF(A(K)    .LT.A(INDI)) GO TO 250                                AORDER     21
        140 CONTINUE                                                         AORDER     22
            GO TO 100                                                        AORDER     23
        150 X = A(K)                                                         AORDER     24
            J = K                                                            AORDER     25
            DO 160  M = I,L                                                  AORDER     26
            A(J) = A(J-1)                                                    AORDER     27
        160 J = J - 1                                                        AORDER     28
            A(I) = X                                                         AORDER     29
            GO TO 100                                                        AORDER     30
        250 J=K                                                              AORDER     31
            DO 260 M=I,L                                                     AORDER     32
            IPERM(J)=IPERM(J-1)                                              AORDER     33
        260 J=J-1                                                            AORDER     34
            IPERM(I)=K                                                       AORDER     35
            GO TO 100                                                        AORDER     36
        270 CONTINUE                                                         AORDER     37
        170 RETURN                                                           AORDER     38
            END                                                              AORDER     39
```

```
      SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS       DEF LINE      REFERENCES
   3  AORDER           1             37

VARIABLES     SN  TYPE           RELOCATION
   O  A           REAL      ARRAY     F.P.     REFS          3      2*15      2*16      2*18      2*20      23      26
                                            DEFINED          1        26        28
 115  I           INTEGER                      REFS        2*7        12        15        16        25      28      31
                                                 34    DEFINED         6        11
 117  INDI        INTEGER                      REFS         18        20   DEFINED        12
   O  IPERM       INTEGER   ARRAY     F.P.     REFS          3        12        32   DEFINED         1       7      32
                                                 34
 121  J           INTEGER                      REFS       2*26        27      2*32        33   DEFINED      24      27
```

```
VARIABLES      SN  TYPE             RELOCATION
                                                  30      33
  113  K          INTEGER                       REFS       8       9      10      15      16      18      20
                                                  23      24      30      34  DEFINED      4       9
  116  L          INTEGER                       REFS      11      25      31  DEFINED      8
  122  M          INTEGER                    DEFINED      25      31
  114  M1         INTEGER                       REFS       6      10  DEFINED      5
    O  N          INTEGER            F.P.       REFS       5      14      17  DEFINED      1
    O  NCON       INTEGER            F.P.       REFS      13  DEFINED       1
  120  X          REAL                          REFS      28  DEFINED      23

INLINE FUNCTIONS    TYPE    ARGS        DEF LINE   REFERENCES
       IABS        INTEGER    1  INTRIN                 5

STATEMENT LABELS                    DEF LINE   REFERENCES
    O  10                               7          6
   17  100                              8         22      29      35
    O  110           INACTIVE          11       2*10
    O  120           INACTIVE          15         14
   35  130                             16         14
   51  140                             21         11    2*15    2*16      19
   54  150                             23         15      16
    O  160                             27         25
  112  170                             37         10      14
    O  180           INACTIVE          14       2*13
   41  200                             17         13
    O  220           INACTIVE          18         17
   46  230                             20         17
   74  250                             30         18      20
    O  260                             33         31
  112  270                             36         17

LOOPS  LABEL     INDEX     FROM-TO     LENGTH     PROPERTIES
   14   10        I          6 7         2B        INSTACK
   24   140       I         11 21       30B          OPT       EXITS
   65   160       M         25 27        2B        INSTACK
  103   260       M         31 33        2B        INSTACK

STATISTICS
  PROGRAM LENGTH                     140B       96
         52000B CM USED
```

```
      SUBROUTINE SCLMAX(A,N,ISCL,AONE,ATWO,XCON,NN)                     SCLMAX     2
C                                                                       SCLMAX     3
      DIMENSION A(1)                                                    SCLMAX     4
      IF(XCON.LT.O.)GO TO 101                                           SCLMAX     5
      AMIN=A(1)                                                         SCLMAX     6
      AMAX=AMIN                                                         SCLMAX     7
      DO 100 I=2,N                                                      SCLMAX     8
      AMAX     =  AMAX1 (AMAX,A(I))                                     SCLMAX     9
      AMIN     =  AMIN1(AMIN,A(I))                                      SCLMAX    10
  100 CONTINUE                                                          SCLMAX    11
      AONE=.5*(AMAX+AMIN-NN*(AMAX-AMIN))                                SCLMAX    12
      ATWO=AONE+NN*(AMAX-AMIN)                                          SCLMAX    13
  101 KOUNT=O                                                           SCLMAX    14
      KOUNT2=O                                                          SCLMAX    15
      ABONE=ABS(AONE)                                                   SCLMAX    16
      ABTWO=ABS(ATWO)                                                   SCLMAX    17
      ZMAX=ABONE                                                        SCLMAX    18
      ZMIN=ABTWO                                                        SCLMAX    19
      IF(ABTWO.GT.ABONE) GO TO  10                                      SCLMAX    20
      GO TO 11                                                          SCLMAX    21
   10 KOUNT=1                                                           SCLMAX    22
      ZMAX=ABTWO                                                        SCLMAX    23
      ZMIN=ABONE                                                        SCLMAX    24
   11 SN1=AONE*ATWO                                                     SCLMAX    25
      IF(SN1.LT.O.O) GO TO 13                                           SCLMAX    26
      AD=ZMAX                                                           SCLMAX    27
      GO TO 15                                                          SCLMAX    28
   13 DO 14 J=1,2                                                       SCLMAX    29
      ZN=J                                                              SCLMAX    30
      AD=(ZMAX/(5.-ZN))                                                 SCLMAX    31
      AZ=ZN*AD                                                          SCLMAX    32
      IF(AZ-ZMIN) 14,15,15                                              SCLMAX    33
   14 CONTINUE                                                          SCLMAX    34
      ZN=3.                                                             SCLMAX    35
      AD=(ZMIN/2.)                                                      SCLMAX    36
   15 IF(AD.GE.1.O.AND.AD.LT.10.O)  AA=1.O                              SCLMAX    37
      IF (AD.LT.1.O.OR.AD.GE.10.O) AA = ALOG1O(AD)                      SCLMAX    38
      ISCL = INT(AA)                                                    SCLMAX    39
      IF (SIGN(1.O,AA).GT.O.O.AND.FLOAT(ISCL).EQ.AA) ISCL = ISCL - 1    SCLMAX    40
      IF (SIGN(1.O,AA).LT.O.O.AND.FLOAT(ISCL).NE.AA) ISCL = ISCL - 1    SCLMAX    41
      IF(XCON.LT.O.O.AND.SN1.GE.O.O) GO TO 18                           SCLMAX    42
      IF(KOUNT2.EQ.1) GO TO 18                                          SCLMAX    43
      AD= ROUND(AD,ISCL)                                                SCLMAX    44
      KOUNT2=1                                                          SCLMAX    45
      IF(SN1.GE.O.O) GO TO 16                                           SCLMAX    46
      IF(KOUNT.EQ.1) GO TO 19                                           SCLMAX    47
      SN2=SIGN(1.O,ATWO)                                                SCLMAX    48
      IF(ZN.EQ.3.O) GO TO 20                                            SCLMAX    49
      ATWO =SN2*ZN*AD                                                   SCLMAX    50
      AONE=-SN2*(5.-ZN)*AD                                              SCLMAX    51
      GO TO 21                                                          SCLMAX    52
   20 ATWO=SN2*2.*AD                                                    SCLMAX    53
      AONE=-SN2*3.*AD                                                   SCLMAX    54
   21 AD=ABS(AONE)                                                      SCLMAX    55
      GO TO 15                                                          SCLMAX    56
   19 SN2=SIGN(1.O,AONE)                                                SCLMAX    57
```

```
                AONE=SN2*ZN*AD                                                 SCLMAX      59
                ATWO=-SN2*(5.-ZN)*AD                                           SCLMAX      60
                GO TO 23                                                       SCLMAX      61
             22 AONE=SN2*2.*AD                                                 SCLMAX      62
                ATWO=-SN2*3.*AD                                                SCLMAX      63
             23 AD=ABS(ATWO)                                                   SCLMAX      64
                GO TO 15                                                       SCLMAX      65
             16 IF(KOUNT.EQ.1) GO TO 17                                        SCLMAX      66
                ATWO=0.0                                                       SCLMAX      67
                SN3=SIGN(1.0,AONE)                                             SCLMAX      68
                AONE=SN3*AD                                                    SCLMAX      69
                GO TO 18                                                       SCLMAX      70
             17 AONE=0.0                                                       SCLMAX      71
                SN3=SIGN(1.0,ATWO)                                             SCLMAX      72
                ATWO=SN3*AD                                                    SCLMAX      73
             18 CONTINUE                                                       SCLMAX      74
                RETURN                                                         SCLMAX      75
                 END                                                           SCLMAX      76



      SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS     DEF LINE     REFERENCES
    3  SCLMAX        1          74

VARIABLES      SN  TYPE          RELOCATION
    0  A           REAL      ARRAY    F.P.      REFS        3        5        8        9  DEFINED        1
  243  AA          REAL                         REFS       38     2*39     2*40  DEFINED       36       37
  232  ABONE       REAL                         REFS       17       19       23  DEFINED       15
  233  ABTWO       REAL                         REFS       18       19       22  DEFINED       16
  237  AD          REAL                         REFS       31     2*36     3*37       43       49       50       52
                                                  53       58       59       61       62       68       72
                                             DEFINED       26       30       35       43       54       63
  226  AMAX        REAL                         REFS        8     2*11       12  DEFINED        6        8
  225  AMIN        REAL                         REFS        6        9     2*11       12  DEFINED        5        9
    0  AONE        REAL               F.P.      REFS       12       15       24       54       56       67
                                             DEFINED        1       11       50       53       58       61       68
                                                  70
    0  ATWO        REAL               F.P.      REFS       16       24       47       63       71
                                             DEFINED        1       12       49       52       59       62       66
                                                  72
  242  AZ          REAL                         REFS       32  DEFINED       31
  227  I           INTEGER                      REFS        8        9  DEFINED        7
    0  ISCL        INTEGER            F.P.      REFS     2*39     2*40       43  DEFINED        1       38       39
                                                  40
  240  J           INTEGER                      REFS       29  DEFINED       28
  230  KOUNT       INTEGER                      REFS       46       65  DEFINED       13       21
  231  KOUNT2      INTEGER                      REFS       42  DEFINED       14       44
    0  N           INTEGER            F.P.      REFS        7  DEFINED        1
    0  NN          INTEGER            F.P.      REFS       11       12  DEFINED        1
  236  SN1         REAL                         REFS       25       41       45  DEFINED       24
  244  SN2         REAL                         REFS       49       50       52       53       58       59       61
                                                  62  DEFINED       47       56
  245  SN3         REAL                         REFS       68       72  DEFINED       67       71
```

```
VARIABLES     SN  TYPE            RELOCATION
    0  XCON       REAL                  F.P.      REFS          4        41    DEFINED       1
  234  ZMAX       REAL                            REFS         26        30    DEFINED      17       22
  235  ZMIN       REAL                            REFS         32        35    DEFINED      18       23
  241  ZN         REAL                            REFS         30        31         48      49       50       57       58
                                                    59    DEFINED        29         34

EXTERNALS          TYPE    ARGS        REFERENCES
       ALOG10     REAL       1 LIBRARY      37
       ROUND      REAL       2              43

INLINE FUNCTIONS   TYPE    ARGS         DEF LINE   REFERENCES
       ABS        REAL       1  INTRIN                15        16        54        63
       AMAX1      REAL       0  INTRIN                 8
       AMIN1      REAL       0  INTRIN                 9
       FLOAT      REAL       1  INTRIN                39        40
       INT        INTEGER    1  INTRIN                38
       SIGN       REAL       2  INTRIN                39        40        47        56        67        71

STATEMENT LABELS               DEF LINE    REFERENCES
   43  10                          21          19
   47  11                          24          20
   54  13                          28          25
    0  14                          33          28        32
   71  15                          36          27      2*32        55        64
  177  16                          65          45
  206  17                          70          65
  213  18                          73          41        42        69
  156  19                          56          46
  146  20                          52          48
  153  21                          54          51
  167  22                          61          57
  174  23                          63          60
    0  100                         10           7
   33  101                         13           4

LOOPS  LABEL    INDEX    FROM-TO    LENGTH    PROPERTIES
   15  100      I           7 10        6B     INSTACK
   55  14       J          28 33       11B       OPT      EXITS

STATISTICS
  PROGRAM LENGTH               246B      166
        52000B CM USED
```

```
               FUNCTION  ROUND (X,ISCL)                                          ROUND        2
          C                                                                      ROUND        3
          C            ROUND OFF ROUTINE FOR SCALING                             ROUND        4
          C                                                                      ROUND        5
               ISSL  =  ISCL  -  1                                               ROUND        6
               AX = X/10.0**ISSL                                                 ROUND        7
               BX      =  IFIX (AX)                                              ROUND        8
               DX      =  ABS(AX) - ABS(BX)                                      ROUND        9
               RDX = ABS(DX) / ABS(AX)                                           ROUND       10
               IF (RDX .GT. 0.01)      GO TO 5                                   ROUND       11
               DX = 0.0                                                          ROUND       12
               GO TO 10                                                          ROUND       13
             5 CONTINUE                                                          ROUND       14
               IF ( DX .LE. 0.5 )      DX = SIGN (0.5,X)                         ROUND       15
               IF ( DX .GT. 0.5 )      DX = SIGN (1.0,X)                         ROUND       16
            10 ROUND = (BX + DX)*10.0**ISSL                                      ROUND       17
                        RETURN                                                   ROUND       18
                        END                                                      ROUND       19
```

```
      SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS     DEF LINE     REFERENCES
    4  ROUND         1          17

VARIABLES     SN  TYPE            RELOCATION
   50  AX         REAL                          REFS         7        8        9   DEFINED       6
   51  BX         REAL                          REFS         8       16   DEFINED       7
   52  DX         REAL                          REFS         9       14       15       16   DEFINED       8       11
                                                  14        15
    0  ISCL       INTEGER          F.P.         REFS         5   DEFINED       1
   47  ISSL       INTEGER                       REFS         6       16   DEFINED       5
   53  RDX        REAL                          REFS        10   DEFINED       9
   46  ROUND      REAL                       DEFINED        16
    0  X          REAL             F.P.         REFS         6       14       15   DEFINED       1

INLINE FUNCTIONS   TYPE   ARGS        DEF LINE  REFERENCES
       ABS        REAL      1  INTRIN              2*8        2*9
       IFIX       INTEGER   1  INTRIN               7
       SIGN       REAL      2  INTRIN              14         15

STATEMENT LABELS             DEF LINE   REFERENCES
   24  5                        13         10
   35  10                       16         12

STATISTICS
  PROGRAM LENGTH                54B        44
         52000B CM USED
```

```
  1                 SUBROUTINE SCLINC(AONE,ATWO,XX,EXTRA,AORG,IA)                 SCLINC      2
              C                                                                   SCLINC      3
                    IF(IA)110,110,120                                             SCLINC      4
                120 XINCH=XX/10.                                                  SCLINC      5
  5                 GO TO 100                                                     SCLINC      6
                110 XINCH =XX/5.                                                  SCLINC      7
                100 AORG=AONE                                                     SCLINC      8
                    EXTRA=    (ATWO-AONE)/XINCH                                   SCLINC      9
                    RETURN                                                        SCLINC     10
 10                 END                                                           SCLINC     11
```

```
      SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS      DEF LINE      REFERENCES
    3  SCLINC          1           9

VARIABLES       SN  TYPE             RELOCATION
    O  AONE         REAL                 F.P.       REFS          7          8    DEFINED          1
    O  AORG         REAL                 F.P.    DEFINED          1          7
    O  ATWO         REAL                 F.P.       REFS          8    DEFINED          1
    O  EXTRA        REAL                 F.P.    DEFINED          1          8
    O  IA           INTEGER              F.P.       REFS          3    DEFINED          1
   23  XINCH        REAL                            REFS          8    DEFINED          4          6
    O  XX           REAL                 F.P.       REFS          4          6    DEFINED          1

STATEMENT LABELS                DEF LINE   REFERENCES
   14  100                          7          5
   12  110                          6        2*3
    O  120          INACTIVE        4          3

STATISTICS
  PROGRAM LENGTH                    24B        20
          52000B CM USED
```

```
                 FUNCTION FATAN (X,Y)                                     FATAN     2
       C         PROGRAM TO ASSIGN QUADRANT FOR PHASE ANGLE ********************  FATAN     3
                 C = 1.0E+06                                              FATAN     4
                 A = ABS (X*C)                                            FATAN     5
                 B = ABS (Y*C)                                            FATAN     6
                 AX = ABS (X)                                             FATAN     7
                 AY = ABS (Y)                                             FATAN     8
                 IF (A.LE.AY) GO TO 1                                     FATAN     9
                 IF (AX.GE.B) GO TO 2                                     FATAN    10
                 FATAN = ATAN2 (X,Y)                                      FATAN    11
                 GO TO 3                                                  FATAN    12
               1 FATAN = 0.0                                              FATAN    13
                 GO TO 3                                                  FATAN    14
               2 FATAN = 1.570796 * SIGN(1.0,X) * SIGN(1.0,Y)             FATAN    15
               3 RETURN                                                   FATAN    16
                 END                                                      FATAN    17
```

```
         SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS     DEF LINE     REFERENCES
    4  FATAN          1           15

VARIABLES      SN  TYPE            RELOCATION
    37  A          REAL                          REFS        8   DEFINED      4
    41  AX         REAL                          REFS        9   DEFINED      6
    42  AY         REAL                          REFS        8   DEFINED      7
    40  B          REAL                          REFS        9   DEFINED      5
    36  C          REAL                          REFS        4         5   DEFINED      3
    35  FATAN      REAL                        DEFINED      10        12        14
     0  X          REAL                F.P.      REFS        4         6        10       14   DEFINED     1
     0  Y          REAL                F.P.      REFS        5         7        10       14   DEFINED     1

EXTERNALS          TYPE    ARGS        REFERENCES
       ATAN2       REAL      2 LIBRARY     10

INLINE FUNCTIONS   TYPE    ARGS       DEF LINE  REFERENCES
       ABS         REAL      1  INTRIN               4        5         6         7
       SIGN        REAL      2  INTRIN             2*14

STATEMENT LABELS              DEF LINE    REFERENCES
    22  1                        12           8
    24  2                        14           9
    31  3                        15          11          13

STATISTICS
  PROGRAM LENGTH                 43B         35
        52000B CM USED
```

```
      SUBROUTINE RODDEN                                                 RODDEN     2
C                                                                       RODDEN     3
      COMPLEX  B(40,40), DETAD(40,40), GENFM(40,40)                     RODDEN     4
      COMPLEX  AUGM(530), WQ(130)                                       RODDEN     5
      COMPLEX GENFT                                                     RODDEN     6
C                                                                       RODDEN     7
      DIMENSION QMWT(40,5), QWT(5)                                      RODDEN     8
      DIMENSION VBO(30), RVBO(15)                                       RODDEN     9
      DIMENSION LC(40)                                                  RODDEN    10
      DIMENSION LIM(50,3)                                               RODDEN    11
      DIMENSION WW(40,40), OMG(40)                                      RODDEN    12
      DIMENSION       COEFP(50) ,     COEFB(20) ,      YIN(50)          RODDEN    13
      DIMENSION         ZIN(50)                                         RODDEN    14
      DIMENSION ITAPES(50),IFILES(50)                                   RODDEN    15
      DIMENSION TSHF(1)                                                 RODDEN    16
      DIMENSION NAMDUB(2), NAME(2)                                      RODDEN    17
C                                                                       RODDEN    18
      COMMON /VARBLS / NCNSM1,NB,NDELT,NDATA,NOPAN,IQ,IR,JSPECS,        RODDEN    19
     1                 NCARAY(50),NSARAY(50),NBARAY(50),ACAP,B2,FL,PI,  RODDEN    20
     2                 KR,KRDBR,GMA(50),X(400),Y(400),ZZ(400),Z1(400),  RODDEN    21
     3                 P1(400),ZZ1(400),Z2(400),P2(400),ZZ2(400),       RODDEN    22
     4                 EV(400),PV(400),ZV(400),SDELX(400),DELY(400),    RODDEN    23
     5                 XO(50),YO(50),ZO(50),GGMA(50)                    RODDEN    24
      COMMON /XYZ/YS(50),DELYS(50),ZS(50),DELZS(50),FGAMMA(50),CWIG(50) RODDEN    25
     1            ,DUMMY(50)                                            RODDEN    26
      COMMON /YZY/   X1A(50), X3A(50), X5A(50),X7A(50),X2A(50)          RODDEN    27
      COMMON  /XXZ/  XOC(400),XIJ(50)                                   RODDEN    28
      COMMON  /P1GW/  CT1(50),CT2(50),TS(50)                            RODDEN    29
      COMMON  /NTPS/  NTP1,NTP2,NTP3,NTP4,NTP5,NTP6,NTP7,NTP8,NTP9,NTP10 RODDEN    30
      COMMON/BODY/ RO(100), ROP(100), NBEA(20), BGMA(20), MRK(20,2),    RODDEN    31
     1            XBO(20), YBO(20), ZBO(20)                             RODDEN    32
C                                                                       RODDEN    33
      REAL   K10,K20,K1RT1,K1IT1,K2RT2P,K2IT2P,K1OT1,K2OT2P             RODDEN    34
      REAL   KR,KRDBR                                                   RODDEN    35
C                                                                       RODDEN    36
      COMMON  /DLM/  K10,K20,K1RT1,K1IT1,K2RT2P,K2IT2P,K1OT1,K2OT2P,E2  RODDEN    37
      COMMON /MODD  / B, DETAD, WW, OMG, NC                             RODDEN    38
      COMMON /FLUTAN/ FMACH ,BETA  ,VBO   ,RVBO  ,NRVBO                 RODDEN    39
      COMMON / FLUTQ / QMWT, QWT                                        RODDEN    40
      COMMON/COMA   / LC,CR                                             RODDEN    41
      COMMON / CTAPES / ITAPES                                          RODDEN    42
      COMMON /COMRWP/ ITAPER,ITAPEW,ITAPEP                              RODDEN    43
      COMMON /CTSHF / LTSHF ,TSHF                                       RODDEN    44
      COMMON /CLIST / KOUNT ,KPAGE ,LINES ,LINEST,KLABEL,KTPAGE,NPAGE   RODDEN    45
     1               ,KBPAGE,LINESG,KOUNTH,KOUNTI                       RODDEN    46
      COMMON /CTABLE/ KTABLE,NPASS ,NROWS, NCOLS , NCOLST,KTABLO,NPAGEA RODDEN    47
     1               ,ITAPET                                            RODDEN    48
      COMMON /CFILES/ KFILES,IFILES                                     RODDEN    49
C                                                                       RODDEN    50
      INTEGER RHSTAP                                                    RODDEN    51
C                                                                       RODDEN    52
      LOGICAL KQINT                                                     RODDEN    53
C                                                                       RODDEN    54
      DATA NAMDUB /4HDOUB,4H-AIC/                                       RODDEN    55
C INITIAL CONDITIONS                                                    RODDEN    56
C                                                                       RODDEN    57
      CALL PROGNA (4H(ROD,4HDEN))                                       RODDEN    58
```

```
      COEF   =  1.0
      YDIF   = YCAP(2) - YCAP(1)
      ZDIF   = ZCAP(2) - ZCAP(1)
      IF (ABS(YDIF).LT.SMALL) GO TO 540
      CALL        ATAN3(ZDIF,YDIF,ATANA)
      GMA(ILOOP) = ATANA
      GO TO 550
  540 GMA(ILOOP) = PI/2.0
      IF (ZDIF.LT.0.0) GMA(ILOOP)=-PI/2.0
  550 GMAS(ILOOP)=(GMA(ILOOP)*180.0)/PI
      FOUR = XCAP(4) - XCAP(3) - XCAP(2) + XCAP(1)
      DIFF31 = XCAP(3) - XCAP(1)
      DIFF21 = XCAP(2) - XCAP(1)
      DEL1 = DIFF21
      DO 560 M = NCRUN,NCEND
      DO 560 N = NSRUN,NSEND
      J = M + NC * (N-1)
C ***
C   INDEX -J- EQUALS SUBSCRIPT(M,N)
C ***
      K =(M+1) +  NC * (N-1)
C ***
C   INDEX -K- EQUALS SUBSCRIPT (M+1, N)
C ***
      L = M + NC * N
C ***
C   INDEX -L- EQUALS SUBSCRIPT (M, N+1)
C ***
      KL = (M+1) + NC * N
C ***
C   INDEX -KL- EQUALS SUBSCRIPT (M+1, N+1)
C ***
      ZETA(J)=COEF*(TAU(N)*((TH(M)*FOUR) +DIFF31) + TH(M)*DEL1 + X1)
      PNUP = YDIF*TAU(N)
      PNU(J) = Y1 + PNUP
      ZEEP = ZDIF*TAU(N)
      ZEE(J) = ZEE1 + ZEEP
  560 CONTINUE
      JLIMIT = NC * NS
      LIM1 = 1
      LIM2 = JLIMIT
      J = JBEGIN
      DO 570 I = LIM1,LIM2,NC
      IPNC = I+NC
      XIJ(J) = (ZETA(I) + ZETA(IPNC)) / 2.
  570 J = J + 1
C
      JCU    =  LIM1 - 1
      IR     = -1
      KRETUR = -3
  525 CALL HEAD (LTSHF,TSHF,IROWS,JLIMIT)
      GO TO (526, 527, 528), KHEAD
  526 WRITE(ITAPEW,200) ILOOP,NCNSM1,JLIMIT
  527 CALL PLB (1,1,ITAPEW)
  528 WRITE (ITAPEW,172) JCL, (  ZETA(JC), JC=JCL,JCU)
      IF (KRETUR .LT. 3) GO TO 525
C
```

```
      NSOFAR = 0                                                        PART1     116
      DO 630 LOOP = 1,NOPAN                                             PART1     117
      CALL TITLES (2)                                                   PART1     118
      ILOOP = LOOP                                                      PART1     119
      WRITE (ITAPEW,60) ILOOP                                           PART1     120
      KOUNT  =  KOUNT + 2                                               PART1     121
      CALL PLB (1,1,ITAPEW)                                             PART1     122
      READ (ITAPER,10) XO(LOOP), YO(LOOP), ZO(LOOP), GGMAS              PART1     123
      GGMA (LOOP) = GGMAS*PI/180.0                                      PART1     124
      READ (ITAPER,10) XCAP(1),XCAP(2),XCAP(3),XCAP(4),YCAP(1),YCAP(2)  PART1     125
      READ (ITAPER,25) ZCAP(1),ZCAP(2),NS,NC,COEFF                      PART1     126
      COEFP(ILOOP)=COEFF                                                PART1     127
      IF (COEFF.EQ.0.0)  COEFP(ILOOP)=1.0                               PART1     128
      X1 = XCAP(1)                                                      PART1     129
      Y1 = YCAP(1)                                                      PART1     130
      YIN(ILOOP)= Y1                                                    PART1     131
      ZEE1 = ZCAP(1)                                                    PART1     132
      ZIN(ILOOP)= ZEE1                                                  PART1     133
      CT1(ILOOP)= XCAP(2)-XCAP(1)                                       PART1     134
      CT2(ILOOP)= XCAP(4)-XCAP(3)                                       PART1     135
      KOUNT  =  KOUNT + 5                                               PART1     136
      CALL PLB (1,1,ITAPEW)                                             PART1     137
      WRITE (ITAPEW,30) XCAP(1), YCAP(1), NC,   XCAP(2), YCAP(2), NS    PART1     138
     1                 ,XCAP(3), ZCAP(1), NDELT,XCAP(4), ZCAP(2), NOPAN PART1     139
      NCNSM1 = (NC-1) * (NS-1)                                          PART1     140
      NCARAY(ILOOP) = NC                                                PART1     141
      NSARAY(ILOOP) = NS                                                PART1     142
      NCRUN = 1                                                         PART1     143
      NCEND = NC                                                        PART1     144
      NSRUN = 1                                                         PART1     145
      NSEND = NS                                                        PART1     146
C   INPUT CHORDWISE DIVISIONS *****                                     PART1     147
      READ (ITAPER, 10) (TH(I), I = 1,NC)                               PART1     148
C   INPUT SPANWISE DIVISIONS *****                                      PART1     149
      READ (ITAPER, 10) (TAU(I),I = 1,NS)                               PART1     150
C                                                                       PART1     151
      LSKIP   =  1                                                      PART1     152
      LSUB    =  3                                                      PART1     153
      JCU     =  NCRUN - 1                                              PART1     154
      IR      = -1                                                      PART1     155
      KRETUR = -3                                                       PART1     156
  505 CALL HEAD (LTSHF,TSHF,IROWS,NCEND )                               PART1     157
      GO TO (506, 507, 508), KHEAD                                      PART1     158
  506 WRITE (ITAPEW,180) ILOOP, NC                                      PART1     159
  507 CALL PLB (1,1,ITAPEW)                                             PART1     160
  508 WRITE (ITAPEW,172) JCL, (     TH(JC), JC=JCL,JCU)                 PART1     161
      IF (KRETUR .LT. 3) GO TO 505                                      PART1     162
C                                                                       PART1     163
      JCU     =  NSRUN - 1                                              PART1     164
      IR      = -1                                                      PART1     165
      KRETUR = -3                                                       PART1     166
  515 CALL HEAD (LTSHF,TSHF,IROWS,NSEND )                               PART1     167
      GO TO (516, 517, 518), KHEAD                                      PART1     168
  516 WRITE (ITAPEW,190) ILOOP, NS                                      PART1     169
  517 CALL PLB (1,1,ITAPEW)                                             PART1     170
  518 WRITE (ITAPEW,172) JCL, (    TAU(JC), JC=JCL,JCU)                 PART1     171
      IF (KRETUR .LT. 3) GO TO 515                                      PART1     172
```

```
      IVAR( 5) = 2
      IVAR( 6) = 11
      IVAR( 7) = 5
      IVAR( 8) = 8
      IVAR( 9) = 3
      IVAR(10) = 12
      IVAR(11) = 6
      IVAR(12) = 9
      IVAR(13) =13
      IVAR(14) = 14
      ITAPER = ITAPES(5)
      ITAPEW = ITAPES(6)
      PI = 3.1415926
  450 DO 460  I = 1, 50
      TH(I) = O.
      TAU(I)= O.
      GMA(I) = O.
      GMAS(I)= O.O
  460 F(I) = O.
      DO 470  I = 1,400
      ZETA(I) = O.
      PNU(I) = O.
      ZEE(I)= O.
      DELZ(I) = O.
  470 CONTINUE
      DO 480 I = 1,50
  480 CWIG(I) = O.O
      DO 490   I = 1,50
      FGAMMA(I)= O.
      YS(I)    = O.
      ZS(I)    = O.
      DELZS(I) = O.
  490 DELYS(I) = O.
      NSOFAR = O
      JBEGIN = 1
      JCUM = O
      CALL PROGNA (4H(PAR, 4HT1 ))
      IF ((LINES-KOUNT) .LT. 4) KOUNT = LINES
      CALL TITLES (3)
      CALL PLB (1,1,ITAPEW)
      WRITE (ITAPEW,2000)
      CALL PLB (1,1,ITAPEW)
      KOUNT  =  KOUNT + 4
      NROWS  =  1
      NCOLS  =  O
      KTABLE =  2
      CALL PTABLE (2,51,51
     1   HSURFACE AND BODY GEOMETRY AND ASSOCIATED PARAMETERS)
      KOLUMN =  8
      IF (KREPOR .EQ. 2) KOLUMN = 4
C   *****
C  *** REFSPN = B = B2 IS THE REFERENCE SEMI-SPAN ***
C  *** REFCHD = REFERENCE CHORD = FL IN PROG. CALC.
      WRITE (ITAPEW,40) FL, B2, ACAP, FMACH, BETA
      KOUNT =  KOUNT + 6
      CALL PLB (1,1,ITAPEW)
```

```
      SUBROUTINE PART1(JCUM,COEFP,COEFB,YIN,ZIN)                         PART1     2
C                                                                        PART1     3
      REAL    KR,KRDBR                                                   PART1     4
C                                                                        PART1     5
      DIMENSION IVAR(14)                                                 PART1     6
      DIMENSION TSHF(1)                                                  PART1     7
      DIMENSION VAR(400,14)                                              PART1     8
      DIMENSION    LC(40)                                                PART1     9
C                                                                        PART1    10
      COMMON /VARBLS / NCNSM1,NB,NDELT,NDATA,NOPAN,IQ,IRD,JSPECS,        PART1    11
     1                 NCARAY(50),NSARAY(50),NBARAY(50),ACAP,B2,FL,PI,   PART1    12
     2                 KR,KRDBR,GMA(50),X(400),Y(400),ZZ(400),Z1(400),   PART1    13
     3                 P1(400),ZZ1(400),Z2(400),P2(400),ZZ2(400),        PART1    14
     4                 EV(400),PV(400),ZV(400),SDELX(400),DELY(400),     PART1    15
     5                 XO(50),YO(50),ZO(50),GGMA(50)                     PART1    16
      COMMON/XYZ/ YS(50), DELYS(50), ZS(50), DELZS(50),                  PART1    17
     1            FGAMMA(50), CWIG(50), FGGAM(50)                        PART1    18
      COMMON  /XXZ/  XOC(400),XIJ(50)                                    PART1    19
      COMMON  /P1GW/  CT1(50),CT2(50),TS(50)                             PART1    20
      COMMON /FLUTAN/ FMACH ,BETA  ,VBO   ,RVBO  ,NRVBO                  PART1    21
      COMMON /MODV/  XA(400) , YA(400) , ZA(400)                         PART1    22
C                                                                        PART1    23
      DIMENSION VBO(30), RVBO(15)                                        PART1    24
      DIMENSION  XCAP(4),YCAP(2),ZCAP(2),GMAS(50),                       PART1    25
     1 ZETA(400),PNU(400),ZEE(400),TH(50),TAU(50),DELZ(400) ,RAD(50)     PART1    26
      DIMENSION     COEFP(50) ,    COEFB(20) ,        F(50)              PART1    27
      DIMENSION       YIN(50) ,      ZIN(50)                             PART1    28
      DIMENSION ITAPES(50)                                               PART1    29
C                                                                        PART1    30
      COMMON/BODY/ RO(100), ROP(100), NBEA(20), BGMA(20), MRK(20,2),     PART1    31
     1          XBO(20), YBO(20), ZBO(20)                                PART1    32
      COMMON /COMA  / LC, BR                                             PART1    33
      COMMON / CTAPES / ITAPES                                           PART1    34
      COMMON /CTSHF / LTSHF ,TSHF                                        PART1    35
      COMMON /CLIST / KOUNT ,KPAGE ,LINES ,LINEST,KLABEL,KTPAGE,NPAGE    PART1    36
     1               ,KBPAGE,LINESG,KOUNTH,KOUNTI                        PART1    37
      COMMON /CTABLE/ KTABLE,NPASS ,NROWS ,NCOLS ,NCOLST,KTABLO,NPAGEA   PART1    38
     1               ,ITAPET                                             PART1    39
      COMMON /REPORT/ KREPOR                                             PART1    40
      COMMON /CHEAD / KHEAD,KRETUR,KOLUMN,IR,JCL,JCU,LSUB,LSKIP          PART1    41
C                                                                        PART1    42
      EQUIVALENCE (VAR(1,1), X(1))                                       PART1    43
C                                                                        PART1    44
C FUNCTION DEFINITION                                                    PART1    45
C                                                                        PART1    46
      MINOF(I,J)    =  MINO(I,J)                                         PART1    47
C                                                                        PART1    48
C INITIAL CONDITIONS                                                     PART1    49
C                                                                        PART1    50
      ZERO   =  0.0                                                      PART1    51
      NLISTD =  14                                                       PART1    52
      NELEMD =  400                                                      PART1    53
      CALL DVALUE (VAR   ,ZERO,NELEMD*NLISTD)                            PART1    54
      IVAR( 1) = 1                                                       PART1    55
      IVAR( 2) = 10                                                      PART1    56
      IVAR( 3) = 4                                                       PART1    57
      IVAR( 4) = 7                                                       PART1    58
```

```
COMMON BLOCKS   LENGTH     MEMBERS - BIAS NAME(LENGTH)
                                     6 K1OT1  (1)              7 K2OT2P (1)              8 E2      (1)
      MODD        8041               0 B      (3200)        3200 DETAD  (3200)        6400 WW      (1600)
                                  8000 OMG    (40)          8040 NC     (1)
      FLUTAN        48               0 FMACH  (1)              1 BETA   (1)              2 VBO     (30)
                                    32 RVBO   (15)            47 NRVBO  (1)
      FLUTQ        205               0 QMWT   (200)          200 QWT    (5)
      COMA          41               0 LC     (40)            40 CR     (1)
      CTAPES        50               0 ITAPES (50)
      COMRWP         3               0 ITAPER (1)              1 ITAPEW (1)              2 ITAPEP (1)
      CTSHF          2               0 LTSHF  (1)              1 TSHF   (1)
      CLIST         11               0 KOUNT  (1)              1 KPAGE  (1)              2 LINES   (1)
                                     3 LINEST (1)              4 KLABEL (1)              5 KTPAGE  (1)
                                     6 NPAGE  (1)              7 KBPAGE (1)              8 LINESG  (1)
                                     9 KOUNTH (1)             10 KOUNTI (1)
      CTABLE         8               0 KTABLE (1)              1 NPASS  (1)              2 NROWS   (1)
                                     3 NCOLS  (1)              4 NCOLST (1)              5 KTABLO  (1)
                                     6 NPAGEA (1)              7 ITAPET (1)
      CFILES        51               0 KFILES (1)              1 IFILES (50)

STATISTICS
  PROGRAM LENGTH                 12506B    5446
  CM LABELED COMMON LENGTH       37241B   16033
          52000B CM USED
```

```
STATEMENT LABELS              DEF LINE   REFERENCES
  213  42                        157        152        155
  212  43                        156        153
  234  46                        169        165
  754  47        FMT             255        130
  236  48                        171        168
  756  55        FMT             256         89        129        144
    0  109                        86         85
  253  152                       184        177
  450  160                       246        161        219
    0  200                       242        240
    0  202                       243        239
    0  203                       245        244
  312  450                       207        217
  760  1000      FMT             257        106
  323  8000                      210        198        205        209
  335  9002                      218        209

LOOPS  LABEL    INDEX    FROM-TO    LENGTH    PROPERTIES
   52  109      K         85  86        2B      INSTACK
  144           I        130 130       11B                EXT REFS
  214  160      J        161 246      237B                EXT REFS  NOT INNER
  343  6        I        229 234       24B                NOT INNER
  355  6        III      231 234        6B      INSTACK
  406  202      I        239 243       21B                NOT INNER
  415  200      II       240 242        7B      INSTACK
  430  203      I        244 245       20B                EXT REFS  NOT INNER
  433           II       245 245       11B                EXT REFS

COMMON BLOCKS   LENGTH     MEMBERS - BIAS NAME(LENGTH)
       VARBLS     6014          0 NCNSM1 (1)          1 NB     (1)          2 NDELT  (1)
                                3 NDATA  (1)          4 NOPAN  (1)          5 IQ     (1)
                                6 IR     (1)          7 JSPECS (1)          8 NCARAY (50)
                               58 NSARAY (50)       108 NBARAY (50)       158 ACAP   (1)
                              159 B2     (1)        160 FL     (1)        161 PI     (1)
                              162 KR     (1)        163 KRDBR  (1)        164 GMA    (50)
                              214 X      (400)      614 Y      (400)     1014 ZZ     (400)
                             1414 Z1     (400)     1814 P1     (400)     2214 ZZ1    (400)
                             2614 Z2     (400)     3014 P2     (400)     3414 ZZ2    (400)
                             3814 EV     (400)     4214 PV     (400)     4614 ZV     (400)
                             5014 SDELX  (400)     5414 DELY   (400)     5814 XO     (50)
                             5864 YO     (50)      5914 ZO     (50)      5964 GGMA   (50)
       XYZ         350          0 YS     (50)        50 DELYS  (50)       100 ZS     (50)
                              150 DELZS  (50)       200 FGAMMA (50)       250 CWIG   (50)
                              300 DUMMY  (50)
       YZY         250          0 X1A    (50)        50 X3A    (50)       100 X5A    (50)
                              150 X7A    (50)       200 X2A    (50)
       XXZ         450          0 XOC    (400)      400 XIJ    (50)
       P1GW        150          0 CT1    (50)        50 CT2    (50)       100 TS     (50)
       NTPS         10          0 NTP1   (1)          1 NTP2   (1)          2 NTP3   (1)
                                3 NTP4   (1)          4 NTP5   (1)          5 NTP6   (1)
                                6 NTP7   (1)          7 NTP8   (1)          8 NTP9   (1)
                                9 NTP10  (1)
       BODY        340          0 RO     (100)      100 ROP    (100)      200 NBEA   (20)
                              220 BGMA   (20)       240 MRK    (40)       280 XBO    (20)
                              300 YBO    (20)       320 ZBO    (20)
       DLM           9          0 K10    (1)          1 K20    (1)          2 K1RT1  (1)
```

```
VARIABLES     SN  TYPE           RELOCATION
     1  TSHF      REAL      ARRAY    CTSHF        REFS       15        43
     2  VBO       REAL      ARRAY    FLUTAN       REFS        8        38        167        250    DEFINED      170
 11350  WQ        COMPLEX   *UNDEF                REFS        4
 14400  WW        REAL      ARRAY    MODD         REFS       11        37
   326  X         REAL      ARRAY    VARBLS       REFS       18       222
   430  XBO       REAL      ARRAY    BODY         REFS       30
   620  XIJ       REAL      ARRAY    XXZ          REFS       27       222
     0  XOC       REAL      ARRAY    XXZ          REFS       27       222
 13266  XO        REAL      ARRAY    VARBLS       REFS       18
     0  X1A       REAL      ARRAY    YZY          REFS       26
   310  X2A       REAL      ARRAY    YZY          REFS       26
    62  X3A       REAL      ARRAY    YZY          REFS       26
   144  X5A       REAL      ARRAY    YZY          REFS       26
   226  X7A       REAL      ARRAY    YZY          REFS       26
  1146  Y         REAL      ARRAY    VARBLS       REFS       18       222
   454  YBO       REAL      ARRAY    BODY         REFS       30
 12310  YIN       REAL      ARRAY                 REFS       12       122        175
     0  YS        REAL      ARRAY    XYZ          REFS       24
 13350  YO        REAL      ARRAY    VARBLS       REFS       18
   500  ZBO       REAL      ARRAY    BODY         REFS       30
 12372  ZIN       REAL      ARRAY                 REFS       13       122        175
   144  ZS        REAL      ARRAY    XYZ          REFS       24
 11006  ZV        REAL      ARRAY    VARBLS       REFS       18
  1766  ZZ        REAL      ARRAY    VARBLS       REFS       18       222
  4246  ZZ1       REAL      ARRAY    VARBLS       REFS       18
  6526  ZZ2       REAL      ARRAY    VARBLS       REFS       18
 13432  ZO        REAL      ARRAY    VARBLS       REFS       18
  2606  Z1        REAL      ARRAY    VARBLS       REFS       18
  5066  Z2        REAL      ARRAY    VARBLS       REFS       18
        VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS           TYPE   ARGS        REFERENCES
        BIDI                 3            139
        DCLOSE               1            204
        FUTSOL              12            215
        GEDLAB               6            212
        GENF                20            222
        GENQ                15            175
        GLOBAL               1            146
        MERGE                2            140
        MIDI                 3            135
        PART1                5            122
        PLB                  3            105        107
        PROGNA               2             57
        PRT2                 2            182
        PTABLE               3            112        116
        PUDLAB               6            202
        QINTP                7            250
        QUAS                12            203
        TIMEB                2            123
        TITLES               1            104

STATEMENT LABELS              DEF LINE   REFERENCES
   455  2                        261        247
   167  5                        141        136
     0  6                        234        229        231
   752  20        FMT            254         88
```

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VARIABLES      SN  TYPE            RELOCATION
     2  NDELT      INTEGER                VARBLS     REFS        18     222   DEFINED      89
  1057  NF         INTEGER                           REFS       162     211       212     215   DEFINED     149     162
  1060  NFILE      INTEGER                           REFS       201     202       203  DEFINED       150     201
  1067  NI         INTEGER                           REFS       203     215   DEFINED     185   I/O REFS    193
  1052  NM         INTEGER                           REFS       135     139       140  DEFINED       131
  1021  NMD        INTEGER                           REFS       175     206       216     222   DEFINED      81     132
  1065  NMTB     * INTEGER                           REFS       175
  1064  NMTP     * INTEGER                           REFS       175
  1073  NO         INTEGER                           REFS       203     215   DEFINED     190
     4  NOPAN      INTEGER                VARBLS     REFS        18  DEFINED      101
  1025  NP         INTEGER                           REFS       101  DEFINED       89
     6  NPAGE      INTEGER                CLIST      REFS        44
     6  NPAGEA     INTEGER                CTABLE     REFS        46
     1  NPASS      INTEGER                CTABLE     REFS        46
  1053  NPOINT     INTEGER                           REFS       135     139
  1045  NPR1       INT.‾ER                           REFS       203     215   DEFINED     129
  1061  NRF        INTEGER                           REFS       161     175   DEFINED     151       154     156
     2  NROWS      INTEGER                CTABLE     REFS        46  DEFINED      109     114
    57  NRVBO      INTEGER                FLUTAN     REFS        38     154       250
    72  NSARAY     INTEGER     ARRAY      VARBLS     REFS        18
  1042  NSTRIP     INTEGER                           REFS       130     222   DEFINED     125       129
  1046  NSV        INTEGER                           REFS       222  DEFINED      129
  1054  NTBOX      INTEGER                           REFS       135     139       140
  1044  NTOT       INTEGER                           REFS       222  DEFINED      128
     0  NTP1       INTEGER                NTPS       REFS        29     185   DEFINED      60   I/O REFS    178
    11  NTP10      INTEGER                NTPS       REFS        29  DEFINED       69
     1  NTP2       INTEGER                NTPS       REFS        29      73   DEFINED      61
     2  NTP3       INTEGER                NTPS       REFS        29     191   DEFINED      62
     3  NTP4       INTEGER                NTPS       REFS        29     192   DEFINED      63
     4  NTP5       INTEGER                NTPS       REFS        29  DEFINED       64
     5  NTP6       INTEGER                NTPS       REFS        29  DEFINED       65
     6  NTP7       INTEGER                NTPS       REFS        29  DEFINED       66
     7  NTP8       INTEGER                NTPS       REFS        29     189   DEFINED      67
    10  NTP9       INTEGER                NTPS       REFS        29     190   DEFINED      68
  1074  NW         INTEGER                           REFS       203     215   DEFINED     191   I/O REFS    208
  1050  NYAW       INTEGER                           REFS       182  DEFINED      129
  1032  N1         INTEGER                           REFS       177     198   DEFINED      94
  1027  N3         INTEGER                           REFS       100  DEFINED       89
  1030  N4         INTEGER                           REFS       175  DEFINED       89
  1033  N5         INTEGER                           REFS       175  DEFINED       95      96
  1034  N6         INTEGER                           REFS       175  DEFINED       97
  1031  N7         INTEGER                           REFS       219  DEFINED       89
 17500  OMG        REAL        ARRAY      MODD       REFS        11      37
   241  PI         REAL                   VARBLS     REFS        18  DEFINED       82
 10166  PV         REAL        ARRAY      VARBLS     REFS        18
  3426  P1         REAL        ARRAY      VARBLS     REFS        18
  5706  P2         REAL        ARRAY      VARBLS     REFS        18
     0  QMWT       REAL        ARRAY      FLUTQ      REFS         7      39     2*241
   310  QWT        REAL        ARRAY      FLUTQ      REFS         7      39       241
  1010  RHSTAP     INTEGER                           REFS        50     203       215  DEFINED       192
                                                  I/O REFS      195
    40  RVBO       REAL        ARRAY      FLUTAN     REFS         8      38       166     250
     0  RO         REAL        ARRAY      BODY       REFS        30
   144  ROP        REAL        ARRAY      BODY       REFS        30
  1036  S          REAL                              REFS       237     238   DEFINED      99
 11626  SDELX      REAL        ARRAY      VARBLS     REFS        18     222
   144  TS         REAL        ARRAY      P1GW       REFS        28
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VARIABLES     SN  TYPE              RELOCATION
     1 KPAGE      INTEGER               CLIST       REFS         44
  1011 KQINT      LOGICAL                           REFS         52        166        167        247    DEFINED         76         77
                                                     78
   242 KR         REAL                  VARBLS      REFS         18         34        172        222      2*238
                                                 DEFINED        166        167        169
   243 KRDBR      REAL                  VARBLS      REFS         18         34    DEFINED        172
     0 KTABLE     INTEGER               CTABLE      REFS         46    DEFINED        111        115
     5 KTABLO     INTEGER               CTABLE      REFS         46
     5 KTPAGE     INTEGER               CLIST       REFS         44
     3 K1IT1      REAL                  DLM         REFS         33         36
     2 K1RT1      REAL                  DLM         REFS         33         36
     0 K10        REAL                  DLM         REFS         33         36
     6 K1OT1      REAL                  DLM         REFS         33         36
     5 K2IT2P     REAL                  DLM         REFS         33         36
     4 K2RT2P     REAL                  DLM         REFS         33         36
     1 K20        REAL                  DLM         REFS         33         36
     7 K2OT2P     REAL                  DLM         REFS         33         36
     0 LC         INTEGER     ARRAY     COMA        REFS          9         40         77         78         94         96        102
                                                    131         132        151        152      2*153        154      2*165      2*236
                                                    250
  1056 LC12       INTEGER                           REFS        146    DEFINED        145
  1037 LC2        INTEGER                           REFS        229        239        240        244        245        250
                                                 DEFINED        102
  1102 LC8        INTEGER                           REFS        237        238    DEFINED        235        236
 11754 LIM        INTEGER     ARRAY                 REFS         10        222    DEFINED      3*130
     2 LINES      INTEGER               CLIST       REFS         44        103
    10 LINESG     INTEGER               CLIST       REFS         44
     3 LINEST     INTEGER               CLIST       REFS         44
  1014 LTAPE      INTEGER                           REFS        202        203        204        211        212        215
                                                 DEFINED         70
     0 LTSHF      INTEGER               CTSHF       REFS         43
  1071 M          INTEGER                           REFS        203        205        206        215        216
                                                 DEFINED        188
  1020 MD       * INTEGER                        DEFINED         80
  1072 MM         INTEGER                           REFS        203        215    DEFINED        189   I/O REFS        194
   360 MRK        INTEGER     ARRAY     BODY        REFS         30
  1016 MTAP       INTEGER                           REFS        250    DEFINED         72   I/O REFS         75        148        245
  1015 MTAP16     INTEGER                        DEFINED         71   I/O REFS         74        228
 12454 NAMDUB     INTEGER     ARRAY                 REFS         16        202    DEFINED         54
 12456 NAME       INTEGER     ARRAY                 REFS         16        212
  1017 NAT        INTEGER                           REFS        203        215    DEFINED         73   I/O REFS        196
     1 NB         INTEGER               VARBLS      REFS         18      2*127        136        179        222
                                                 DEFINED         89        183
   154 NBARAY     INTEGER     ARRAY     VARBLS      REFS         18    DEFINED         86
  1043 NBE        INTEGER                           REFS        128        175    DEFINED        126        127
   310 NBEA       INTEGER     ARRAY     BODY        REFS         30        127
  1066 NBODY      INTEGER                           REFS        183    DEFINED        179
  1041 NBOX       INTEGER                           REFS        128        187        222    DEFINED        124
  1047 NBV        INTEGER                           REFS        162        222    DEFINED        129
 17550 NC         INTEGER               MODD        REFS         37
    10 NCARAY     INTEGER     ARRAY     VARBLS      REFS         18
     0 NCNSM1     INTEGER               VARBLS      REFS         18        124
     3 NCOLS      INTEGER               CTABLE      REFS         46    DEFINED        110
     4 NCOLST     INTEGER               CTABLE      REFS         46
  1026 NCORE      INTEGER                           REFS        175    DEFINED         89
  1070 ND         INTEGER                           REFS        203        215    DEFINED        187
     3 NDATA      INTEGER               VARBLS      REFS         18    DEFINED        100
```

```
VARIABLES      SN  TYPE            RELOCATION
  334  BGMA        REAL      ARRAY    BODY        REFS       30
 1035  BR          REAL                           REFS      172     2*238   DEFINED       98
  237  B2          REAL               VARBLS      REFS       18        99       222    DEFINED       93
12264  COEFB       REAL      ARRAY                REFS       12       122       175
12202  COEFP       REAL      ARRAY                REFS       12       122       175
   50  CR          REAL               COMA        REFS       40        98
    0  CT1         REAL      ARRAY    P1GW        REFS       28
   62  CT2         REAL      ARRAY    P1GW        REFS       28
  372  CWIG        REAL      ARRAY    XYZ         REFS       24
12446  DELY        REAL      ARRAY    VARBLS      REFS       18
   62  DELYS       REAL      ARRAY    XYZ         REFS       24
  226  DELZS       REAL      ARRAY    XYZ         REFS       24
 6200  DETAD       COMPLEX   ARRAY    MODD        REFS        3        37
  454  DUMMY       REAL      ARRAY    XYZ         REFS       24
 7346  EV          REAL      ARRAY    VARBLS      REFS       18       222
   10  E2          REAL               DLM         REFS       36
  310  FGAMMA      REAL      ARRAY    XYZ         REFS       24
  240  FL          REAL               VARBLS      REFS       18       222   DEFINED       88
    0  FMACH       REAL               FLUTAN      REFS       38       250
 1104  GENFM       COMPLEX   ARRAY                REFS        3       232       233       241       245
                                               DEFINED      228       233       234       241
 1006  GENFT       COMPLEX                        REFS        5       234   DEFINED      232
13514  GGMA        REAL      ARRAY    VARBLS      REFS       18
  244  GMA         REAL      ARRAY    VARBLS      REFS       18
 1051  I           INTEGER                        REFS    3*130       230       232     2*233       234     3*241       245
                                               DEFINED      130       229       239       244
    1  IFILES      INTEGER   ARRAY    CFILES      REFS       14        48   DEFINED      211
 1100  II          INTEGER                        REFS      231     3*241       245   DEFINED       230       240       245
 1101  III         INTEGER                        REFS      232     2*233       234   DEFINED       231
    5  IQ          INTEGER            VARBLS      REFS       18   DEFINED        79       164
    6  IR          INTEGER            VARBLS      REFS       18
 1076  IRD       * INTEGER                        REFS      212
 1012  IRDU        INTEGER                        REFS      202   DEFINED        58
    2  ITAPEP      INTEGER            COMRWP      REFS       42
    0  ITAPER      INTEGER            COMRWP      REFS       42        64   I/O REFS       88        89       129       130
                                                   144
    0  ITAPES      INTEGER   ARRAY    CTAPES      REFS       14        41        60        61        62        63        66
                                                    67       68        69        70        71        72
    7  ITAPET      INTEGER            CTABLE      REFS       46
    1  ITAPEW      INTEGER            COMRWP      REFS       42        65       105       107   I/O REFS      106
 1075  IWHICH      INTEGER                        REFS      209   DEFINED       197       206       216
 1062  J           INTEGER                        REFS      163       166       167   DEFINED       161
 1077  JCD       * INTEGER                        REFS      212
 1013  JCDU        INTEGER                        REFS      202   DEFINED        59
 1040  JCUM        INTEGER                        REFS      122       125
 1063  JRF         INTEGER                        REFS      175   DEFINED       163
    7  JSPECS      INTEGER            VARBLS      REFS       18   DEFINED       129
 1024  K           INTEGER                        REFS       86   DEFINED        85
    7  KBPAGE      INTEGER            CLIST       REFS       44
 1022  KD          INTEGER                        REFS      203       215   DEFINED       83       186
 1023  KD02        INTEGER                        REFS      175   DEFINED        84
    0  KFILES      INTEGER            CFILES      REFS       48
    4  KLABEL      INTEGER            CLIST       REFS       44
 1055  KLUGLB      INTEGER                        REFS      145   DEFINED       144
    0  KOUNT       INTEGER            CLIST       REFS       44       108   DEFINED      103       108
   11  KOUNTH      INTEGER            CLIST       REFS       44
```

```
            DO 6 I=2,LC2                                                      RODDEN    230
            II= I-1                                                           RODDEN    231
            DO 6 III= 1,II                                                    RODDEN    232
            GENFT= GENFM(I,III)                                               RODDEN    233
            GENFM(I,III)= GENFM(III,I)                                        RODDEN    234
          6 GENFM(III,I)= GENFT                                               RODDEN    235
            LC8  = O                                                          RODDEN    236
            IF (LC(1) EQ 2   OR   LC(33) NE O)   LC8 = 1                      RODDEN    237
            IF (LC8 NE O) ACON = -S/24.                                       RODDEN    238
            IF (LC8 EQ O) ACON = -(S/12 )*(BR/12 )*(BR/12.)/(KR*KR*2.)        RODDEN    239
            DO 202 I = 1,LC2                                                  RODDEN    240
            DO 200  II=1,LC2                                                  RODDEN    241
            GENFM(I,II) = ACON * GENFM(I,II) * QMWT(II,1) * QMWT(I,1) * QWT(1) RODDEN    242
        200 CONTINUE                                                          RODDEN    243
        202 CONTINUE                                                          RODDEN    244
            DO 203 I = 1,LC2                                                  RODDEN    245
        203 WRITE (MTAP) (GENFM(I,II),II=1,LC2)                               RODDEN    246
        160 CONTINUE                                                          RODDEN    247
            IF(.NOT.KQINT) GO TO 2                                            RODDEN    248
      C                                                                       RODDEN    249
      C                           ********* QINTP *********                   RODDEN    250
            CALL QINTP (MTAP,LC2,LC(4),RVBO,NRVBO,FMACH,VBO)                  RODDEN    251
      C                                                                       RODDEN    252
      C FORMATS                                                               RODDEN    253
      C                                                                       RODDEN    254
         20 FORMAT  (4F10 O)                                                  RODDEN    255
         47 FORMAT  (6(1X,3I3))                                               RODDEN    256
         55 FORMAT  (10I5)                                                    RODDEN    257
       1000 FORMAT (10X,51HSUBSONIC UNSTEADY AERODYNAMICS USING DOUBLET LATTIC RODDEN    258
           1            ,19HE PROCEDURE                                       RODDEN    259
           2       ,/10X,62(1H-))                                             RODDEN    260
      C                                                                       RODDEN    261
          2 RETURN                                                            RODDEN    262
            END                                                               RODDEN    263
```

```
CARD NR. SEVERITY  DETAILS    DIAGNOSIS OF PROBLEM

    209     I                AN IF STATEMENT MAY BE MORE EFFICIENT THAN A 2 OR 3 BRANCH COMPUTED GO TO STATEMENT.
```

```
       SYMBOLIC REFERENCE MAP (R=3)

 ENTRY POINTS      DEF LINE      REFERENCES
     1  RODDEN          1         261

 VARIABLES      SN  TYPE           RELOCATION
   236  ACAP        REAL                VARBLS      REFS        18       222   DEFINED       88
  1103  ACON        REAL                            REFS       241   DEFINED       237      238
  7304  AUGM        COMPLEX   *UNDEF                REFS         4
     O  B           COMPLEX    ARRAY    MODD        REFS         3        37
     1  BETA        REAL                FLUTAN      REFS        38
```

```
      KRDBR = KR / BR
C
C                          ********* GENQ  *********
      CALL        GENQ(N4,N5,N6,NRF,JRF,NBE,      NMD,NMTP,NMTB,NCORE,
     1            KDO2,YIN,ZIN,COEFP,COEFB)
      IF (N1 EQ.1)  GO TO 152
      REWIND  NTP1
      NBODY= NB
C
C                          ********* PART2 *********
      CALL   PRT2 (NYAW,NBV)
      NB    = NBODY
  152 CONTINUE
      NI    = NTP1
      KD = 2000
      ND    = NBOX
      M     = O
      MM    = NTP8
      NO    = NTP9
      NW    = NTP3
      RHSTAP=NTP4
      REWIND NI
      REWIND MM
      REWIND RHSTAP
      REWIND NAT
      IWHICH = 1
      IF (N1.NE.O) GO TO 8000
C
C                          ********* QUAS  *********
      NFILE  =  NFILE + 1
      CALL PUDLAB (8HRODDENO1,LTAPE,NAMDUB,NFILE,IRDU,JCDU)
      CALL QUAS (ND,M,KD,NI,MM,NO,NAT,NW,LTAPE,RHSTAP,NPR1,NFILE)
      CALL DCLOSE (LTAPE)
      IF( M .EQ. O ) GO TO 8000
      IF (M.EQ.NMD)     IWHICH=2
  450 CONTINUE
      REWIND NW
      GO TO (8000,9002),IWHICH
 8000 CONTINUE
      IFILES(LTAPE)  =  NF + 1
      CALL GEDLAB (8HRODDENO1,LTAPE,NAME,NF,IRD,JCD)
C
C                          ********* FUTSOL*********
      CALL FUTSOL (ND,M,KD,NI,MM,NO,NAT,NW,LTAPE,NF,RHSTAP,NPR1)
      IF (M.EQ NMD)  IWHICH=2
      GO TO 450
 9002 CONTINUE
      IF (N7 EQ O)  GO TO 160
C
C                          ********* GENF  *********
      CALL        GENF(NDELT,NB,NSTRIP,NBOX,NTOT,NBV,NSV,NMD,LIM,ACAP,FL,
     1            B2.EV,Y,ZZ.SDELX,XIJ,XOC,X,KR)
C
C     TRANSPOSE GEN  AERO FORCES
C     SCALE THE GEN  AERO  FORCES FROM AGARD CONVENTION TO THAT OF EIGM
C
      READ (MTAP16) GENFM
```

```
      KTABLE =  2
      CALL PTABLE (2.18,18
     1   HPROCEDURE (RODDEN))
C
C
C BASIC DATA CALCULATIONS
C
      CALL       PART1(JCUM,COEFP,COEFB,YIN,ZIN)
      CALL TIMEB (25,25HFROM RODDEN, AFTER PART1 )
      NBOX = NCNSM1
      NSTRIP=JCUM
      NBE  = 0
      IF (NB.NE.0)  NBE=NBEA(NB)
      NTOT = NBOX+NBE
      READ (ITAPER,55)  NSTRIP, NPR1, JSPECS, NSV, NBV, NYAW
      READ (ITAPER,47)  (LIM(I,1), LIM(I,2), LIM(I,3),  I=1,NSTRIP)
      NM = LC(2)
      NMD  =  LC(2)
C
C                         *********  MIDI  ********
      CALL MIDI (NM,NPOINT,NTBOX)
      IF (NB.EQ.0) GO TO 5
C
C                         ********* BIDI  *********
      CALL BIDI (NM,NPOINT,NTBOX)
      CALL MERGE (NM,NTBOX)
    5 CONTINUE
C
C                         ********* GLOBAL ********
      READ (ITAPER,55  ) KLUGLB
      LC12 = KLUGLB
      CALL GLOBAL (LC12)
C
      REWIND MTAP
      NF = 0
      NFILE = 0
      NRF = LC(4)
      IF(LC(1) .EQ. -1) GO TO 42
      IF(LC(1) .EQ. 2  OR  LC(33) .EQ. 1) GO TO 43
      IF (LC(13) EQ.1)  NRF = NRVBO
      GO TO 42
   43 NRF = 1
   42 CONTINUE
C
C     ****************** REDUCED FREQUENCY LOOP  ******************
C
      DO 160  J=1,NRF
      NF = NF + 1
      JRF  = J
      IQ   = 0
      IF (LC(33) NE 0.OR.LC(1).EQ.2) GOTO 46
      IF (KQINT) KR = 1.0/RVBO(J)
      IF (.NOT.KQINT) KR= 1.0/VBO(J)
      GO TO 48
   46 KR = 0.0
      VBO(1) = 1.0 E+10
   48 CONTINUE
```

```
      IRDU = 99999                                                      RODDEN    59
      JCDU = 99999                                                      RODDEN    60
      NTP1   =  ITAPES(21)                                              RODDEN    61
      NTP2   =  ITAPES(32)                                              RODDEN    62
      NTP3   =  ITAPES(23)                                              RODDEN    63
      NTP4   =  ITAPES(22)                                              RODDEN    64
      NTP5   =  ITAPER                                                  RODDEN    65
      NTP6   =  ITAPEW                                                  RODDEN    66
      NTP7   =  ITAPES(33)                                              RODDEN    67
      NTP8   =  ITAPES(28)                                              RODDEN    68
      NTP9   =  ITAPES(29)                                              RODDEN    69
      NTP10  =  ITAPES(30)                                              RODDEN    70
      LTAPE  =  ITAPES(31)                                              RODDEN    71
      MTAP16 =  ITAPES(36)                                              RODDEN    72
      MTAP   =  ITAPES(50)                                              RODDEN    73
      NAT  = NTP2                                                       RODDEN    74
      REWIND MTAP16                                                     RODDEN    75
      REWIND MTAP                                                       RODDEN    76
      KQINT = .FALSE.                                                   RODDEN    77
      IF (LC(13).NE.0)  KQINT= .TRUE.                                   RODDEN    78
      IF (LC(1).EQ.-1) KQINT = .TRUE.                                   RODDEN    79
      IQ = 0                                                            RODDEN    80
      MD   = 0                                                          RODDEN    81
      NMD  = 0                                                          RODDEN    82
      PI   = 3.14159265                                                 RODDEN    83
      KD   = 8000                                                       RODDEN    84
      KD02  =  4000                                                     RODDEN    85
      DO 109 K=1,50                                                     RODDEN    86
  109 NBARAY(K)= 0                                                      RODDEN    87
C                                                                       RODDEN    88
      READ (ITAPER,20)  FL, ACAP                                        RODDEN    89
      READ (ITAPER,55)  NDELT,NP,NB,NCORE,N3,N4,N7                      RODDEN    90
C     FL = REFERENCE CHORD                                              RODDEN    91
C     B2 = REFERENCE SEMI-SPAN                                          RODDEN    92
C     ACAP = REFERENCE AREA                                             RODDEN    93
      B2  =  12.                                                        RODDEN    94
      N1  =  LC(22)                                                     RODDEN    95
      N5  =  0                                                          RODDEN    96
      IF (LC(22) .EQ.0)  N5  = 1                                        RODDEN    97
      N6  = 1                                                           RODDEN    98
      BR = 12. * CR                                                     RODDEN    99
      S    = B2                                                         RODDEN   100
      NDATA= N3                                                         RODDEN   101
      NOPAN= NP                                                         RODDEN   102
      LC2 = LC(2)                                                       RODDEN   103
      KOUNT  =  LINES                                                   RODDEN   104
      CALL TITLES (2)                                                   RODDEN   105
      CALL PLB (1,1,ITAPEW)                                             RODDEN   106
      WRITE (ITAPEW,1000)                                               RODDEN   107
      CALL PLB (1,1,ITAPEW)                                             RODDEN   108
      KOUNT  =  KOUNT + 4                                               RODDEN   109
      NROWS  =  1                                                       RODDEN   110
      NCOLS  =  0                                                       RODDEN   111
      KTABLE =  2                                                       RODDEN   112
      CALL PTABLE (1,52,52                                              RODDEN   113
     1   HSUBSONIC UNSTEADY AERODYNAMICS USING DOUBLET LATTICE)         RODDEN   114
      NROWS  =  0                                                       RODDEN   115
```

```
  535 CALL HEAD (LTSHF,TSHF,IROWS,JLIMIT)
      GO TO (536, 537, 538), KHEAD
  536 WRITE(ITAPEW,210) ILOOP,NCNSM1,JLIMIT
  537 CALL PLB (1,1,ITAPEW)
  538 WRITE (ITAPEW,172) JCL, (   PNU(JC), JC=JCL,JCU)
      IF (KRETUR .LT. 3) GO TO 535
C
  545 CALL HEAD (LTSHF,TSHF,IROWS,JLIMIT)
      GO TO (546, 547, 548), KHEAD
  546 WRITE(ITAPEW,215) ILOOP,NCNSM1,JLIMIT
  547 CALL PLB (1,1,ITAPEW)
  548 WRITE (ITAPEW,172) JCL, (   ZEE(JC), JC=JCL,JCU)
      IF (KRETUR .LT. 3) GO TO 545
      JCOUNT = J - JBEGIN - 1
      JEND = J - 2
C
      JCU    =  JBEGIN - 1
      J3=1
      IR     = -1
      KRETUR = -3
  555 CALL HEAD (LTSHF,TSHF,IROWS,JEND  )
      GO TO (556, 557, 558), KHEAD
556   WRITE(ITAPEW,390)ILOOP,JCOUNT
  557 CALL PLB (1,1,ITAPEW)
558   WRITE(ITAPEW,172)J3,(XIJ(JC),JC=JCL,JCU)
      J3=J3+KOLUMN
      IF (KRETUR .LT. 3) GO TO 555
C
      JBEGIN = JBEGIN + (NS-1)
      NCM1  =  NCEND - 1
      NSM1 = NSEND - 1
      DO 604 M = NCRUN,NCM1
      DO 604 N = NSRUN,NSM1
      J = M + NC * (N-1)
      J1 = M + (NC-1) * (N-1)   NSOFAR
C ***
C   INDEX J1 USED TO DISTINGUISH (NC BY NS) ARRAYS FROM (NC-1)X(NS-1)A-S
C ***
C     FINAL ARRAY SINGLE DIMENSION VALUES ARE STORED BY COLUMNS
      K = (M+1) + NC * (N-1)
      L = M + NC * N
      KL = (M+1) + NC * N
      X(J1)=(1  / 8.) * (ZETA(J) + 3. * ZETA(K) + 3. * ZETA(KL)+ZETA(L))
      Y(J1)= (1. / 2.) * (PNU(J) + PNU(L))
      ZZ(J1) = (ZEE(J)+ZEE(L))/2.
      XA(J1)   =   X(J1)
      YA(J1)   =   Y(J1)
      ZA(J1)   =  ZZ(J1)
      Z1(J1)=(3./ 4.)* ZETA(J) + (1. / 4.) * ZETA(K)
      Z2(J1)=(3./ 4.)* ZETA(L) + (1. / 4.) * ZETA(KL)
      P1(J1)= PNU(J)
      P2(J1)= PNU(L)
      ZZ1(J1)= ZEE(J)
      ZZ2(J1)= ZEE(L)
      EV(J1)= (Z1(J1)+ Z2(J1))/ 2.
      PV(J1)= (P1(J1)+ P2(J1))/ 2.
      ZV(J1) = ZZ(J1)
```

```
          DELY(J1)= ABS( P2(J1)- P1(J1))                                 PART1     287
          DELZ(J1) = ABS(ZZ2(J1)-ZZ1(J1))                                PART1     288
          FNUM = ZETA(K) + ZETA(KL) - ZETA(J) - ZETA(L)                  PART1     289
          SDELX(J1)= FNUM / 2.                                           PART1     290
      604 CONTINUE                                                       PART1     291
          J1 = JCUM + 1                                                  PART1     292
          J2 = JCUM + NSM1                                               PART1     293
          M = NSOFAR + 1                                                 PART1     294
          N = NSOFAR + NCM1                                              PART1     295
          KT   = 0                                                       PART1     296
          JIX  = 0                                                       PART1     297
          DO 620 J = J1,J2                                               PART1     298
          JIX  = JIX+1                                                   PART1     299
          KT    = KT+1                                                   PART1     300
          KTP1  = KT+1                                                   PART1     301
          TS(J) =(TAU(KT)+TAU(KTP1))/2.0                                 PART1     302
          DO 603 I=M,N                                                   PART1     303
          DELYS(J)= DELY(I)                                              PART1     304
          YS(J) = Y(I)                                                   PART1     305
          DELZS(J)= DELZ(I)                                              PART1     306
          ZS(J) = ZZ(I)                                                  PART1     307
      603 CWIG(J) = CWIG(J) + SDELX(I)                                   PART1     308
          DO 610  IC= M, N                                               PART1     309
      610 XOC(IC) = (EV(IC)-XIJ(J  ))/CWIG(J)                            PART1     310
          M = N + 1                                                      PART1     311
          FGAMMA(J)=GMA(ILOOP)                                           PART1     312
          FGGAM (J) = GGMA(ILOOP)                                        PART1     313
      620 N = N + NCM1                                                   PART1     314
          JCUM = J2                                                      PART1     315
C                                                                        PART1     316
          J3=1                                                           PART1     317
          JCU    =  J1 - 1                                               PART1     318
          IR     = -1                                                    PART1     319
          KRETUR = -3                                                    PART1     320
      605 CALL HEAD (LTSHF,TSHF,IROWS,JCUM  )                            PART1     321
          GO TO (606, 607, 608), KHEAD                                   PART1     322
    606   WRITE(ITAPEW,330)ILOOP,NSM1                                    PART1     323
      607 CALL PLB (1,1,ITAPEW)                                          PART1     324
    608   WRITE(ITAPEW,172)J3,(CWIG(JC),JC=JCL,JCU)                      PART1     325
          J3=J3+KOLUMN                                                   PART1     326
          IF (KRETUR .LT. 3) GO TO 605                                   PART1     327
C                                                                        PART1     328
      630 NSOFAR = NSOFAR + NCNSM1                                       PART1     329
          DO 640 JY = 1,NSOFAR                                           PART1     330
      640 DELY(JY) = SQRT(DELY(JY)**2 + DELZ(JY)**2)                     PART1     331
          NBA  = 0                                                       PART1     332
          DO 660  IX = 1,NOPAN                                           PART1     333
          NBARAY(IX) = NBA +(NCARAY(IX)-1)* (NSARAY(IX)-1)               PART1     334
      660 NBA = NBARAY(IX)                                               PART1     335
          IF (LC(37) .EQ. 0) GOTO 11                                     PART1     336
C                                                                        PART1     337
          KSAVE  =  KOLUMN                                               PART1     338
          KOLUMN =  KOLUMN*3                                             PART1     339
          KRETUR = -1                                                    PART1     340
      615 CALL HEAD (LTSHF,TSHF,IROWS,NOPAN )                            PART1     341
          GO TO (616, 617, 618), KHEAD                                   PART1     342
```

```
  617 CALL PLB (1,1,ITAPEW)
  618 WRITE (ITAPEW,173) JCL, (NBARAY(JC), JC=JCL,JCU)
      IF (KRETUR .LT. 3) GO TO 615
      KOLUMN =  KSAVE
C
  625 CALL HEAD (LTSHF,TSHF,IROWS,NOPAN )
      GO TO (626, 627, 628), KHEAD
  626 WRITE (ITAPEW,110) NOPAN
  627 CALL PLB (1,1,ITAPEW)
  628 WRITE (ITAPEW,172) JCL, (  GMAS(JC), JC=JCL,JCU)
      IF (KRETUR .LT. 3) GO TO 625
C
   11 CONTINUE
      JLIMIT = NSOFAR
      NCNSM1 = NSOFAR
C
      IF (LC(37) .EQ. 0) GOTO 12
      LSUB   =  20
      IF (KOUNT .GT. (LINES-LSUB)) KOUNT = LINES
      CALL TITLES (2)
      KOUNT  =  KOUNT + LSUB
      CALL PLB (1,1,ITAPEW)
      WRITE (ITAPEW,220) JLIMIT
      CALL PLB (1,1,ITAPEW)
C
      LSUB   =  5
      IROWS  =  JLIMIT
      JCOLS  =  NLISTD + 1
      KRETUR =  0
  635 CALL HEAD (LTSHF,TSHF,IROWS,JCOLS )
      GO TO (636, 637, 638), KHEAD
  636 WRITE (ITAPEW,1000)
  637 CALL PLB (1,1,ITAPEW)
      WRITE (ITAPEW,1001) (JC, JC=JCL,JCU)
  638 CONTINUE
      IF (JCU .LT. JCOLS)
     1WRITE (ITAPEW,1002) IR, (VAR(IR,IVAR(JC)), JC=JCL,JCU)
      JCU1   =  JCU - 1
      JCU2   =  JCU - 2
      IF (JCU .EQ. JCOLS)
     1WRITE (ITAPEW,1002) IR, (VAR(IR,IVAR(JC)), JC=JCL,JCU2), XOC(IR)
     2                      ,  VAR(IR,IVAR(JCU1))
      IF (KRETUR .LT. 3) GO TO 635
C
   12 CONTINUE
C
      IF (NB .EQ. 0) GO TO 910
C   INPUT BODY GEOMETRY
      IY   = 0
      NBOX = JLIMIT
      I    = 0
      IP1  = 0
      KCUM = 0
      JL1  = NBOX+1
      KL1  = NBOX+1
      DO 908 K=1,NB
      READ (ITAPED,10) XBO(K), YBO(K), ZBO(K)
```

```
      READ (ITAPER,35)  ZSC,YSC,NF,NZ,NY,COEFF,MRK(K,1),MRK(K,2)           PART1    401
      WRITE (ITAPEW,45)  K, YSC, ZSC, NY, NZ, COEFF,MRK(K,1),MRK(K,2)      PART1    402
      NFM1 = NF-1                                                          PART1    403
      READ (ITAPER, 10) (F(I),  I = 1,NF)                                  PART1    404
      READ (ITAPER, 10) (RAD(I),I = 1,NF)                                  PART1    405
      WRITE (ITAPEW,115) NF, K                                             PART1    406
      WRITE (ITAPEW,170) ( F(I),  I = 1,NF)                                PART1    407
      WRITE (ITAPEW,125) NF, K                                             PART1    408
      WRITE (ITAPEW,170) (RAD(I), I = 1,NF)                                PART1    409
      BGMA(K) = 0.0                                                        PART1    410
      IF (NY.NE.0)  BGMA(K) = -PI/2.0                                      PART1    411
      IF (NZ.NE.0.AND.NY.NE.0)  BGMA(K) = 0.0                              PART1    412
      COEFB(K) = COEFF                                                     PART1    413
      I     = 0                                                            PART1    414
      IP1   = 0                                                            PART1    415
      JL2   = JL1 + NFM1 - 1                                               PART1    416
      KL2   = JL2                                                          PART1    417
      DO 900 J=JL1,JL2                                                     PART1    418
      KF    = J-NBOX                                                       PART1    419
      I     = I+1                                                          PART1    420
      IP1   = I+1                                                          PART1    421
      X(J) = 0.5*(F(I) + F(IP1))                                           PART1    422
      XA(J)     =   X(J)                                                   PART1    423
      EV(J)= X(J)                                                          PART1    424
      Y(J) = YSC                                                           PART1    425
      YA(J)     =   Y(J)                                                   PART1    426
      PV(J)= YSC                                                           PART1    427
      ZZ(J)= ZSC                                                           PART1    428
      ZA(J)     =  ZZ(J)                                                   PART1    429
      ZV(J)= ZSC                                                           PART1    430
      SDELX(J)= ABS(F(IP1)-F(I))                                           PART1    431
      DELY(J) = 0.5*(RAD(I) + RAD(IP1))                                    PART1    432
      RO(KF)  = DELY(J)                                                    PART1    433
      ROP(KF) = (RAD(IP1) - RAD(I))/SDELX(J)                               PART1    434
  900 CONTINUE                                                             PART1    435
      JL1   = JL2+1                                                        PART1    436
      KCUM = KCUM + NFM1                                                   PART1    437
      NBEA(K) = KCUM                                                       PART1    438
  908 CONTINUE                                                             PART1    439
      WRITE (ITAPEW,135)  KCUM                                             PART1    440
      WRITE (ITAPEW,170) (X( KL),    KL=KL1,KL2)                           PART1    441
      WRITE (ITAPEW,145)  KCUM                                             PART1    442
      WRITE (ITAPEW,170) (EV(KL),    KL=KL1,KL2)                           PART1    443
      WRITE (ITAPEW,155)  KCUM                                             PART1    444
      WRITE (ITAPEW,170) (Y( KL),    KL=KL1,KL2)                           PART1    445
      WRITE (ITAPEW,165)  KCUM                                             PART1    446
      WRITE (ITAPEW,170) (ZZ(KL),    KL=KL1,KL2)                           PART1    447
      WRITE (ITAPEW,175)  KCUM                                             PART1    448
      WRITE (ITAPEW,170) (SDELX(KL), KL=KL1,KL2)                           PART1    449
      WRITE (ITAPEW,185)  KCUM                                             PART1    450
      WRITE (ITAPEW,170) (DELY(KL),  KL=KL1,KL2)                           PART1    451
      WRITE (ITAPEW,195) KCUM                                              PART1    452
      WRITE (ITAPEW,170) (ROP(KF), KF = 1,KCUM)                            PART1    453
      WRITE (ITAPEW,430)                                                   PART1    454
  910 CONTINUE                                                             PART1    455
      NCNSM1 = JLIMIT                                                      PART1    456
C                                                                          PART1    457
```

```
      C
      C FORMATS
      C
         10 FORMAT  (6F10.0)
         25 FORMAT  (2F10.0,1X,2I3,3X,F10.0)
         30 FORMAT (
           1 10X,9HXCAP(1) =,F10.5,1H,,2X,9HYCAP(1) =,F10.5,1H,,2X,7HNC    =
           A,I3,/
           2,10X,9HXCAP(2) =,F10.5,1H,,2X,9HYCAP(2) =,F10.5,1H,,2X,7HNS    =
           B,I3,/
           3,10X,9HXCAP(3) =,F10.5,1H,,2X,9HZCAP(1) =,F10.5,1H,,2X,7HNDELT =
           C,I3,/
           4,10X,9HXCAP(4) =,F10.5,1H,,2X,9HZCAP(2) =,F10.5,1H,,2X,7HNOPAN =
           5,I3)
         35 FORMAT (2F10.0,1X,3I2,3X,F10.0,2I3)
         40 FORMAT (10X,21HREFERENCE CHORD     = F10.5,2X,2HIN
           1      ,/,10X,21HREFERENCE SEMI-SPAN = F10.5,2X,2HIN
           2      ,/,10X,21HREFERENCE AREA      = F10.5,2X,5HIN**2
           3      ,/,10X,21HMACH NUMBER         = F10.5,
           4      ,/,10X,21HBETA                = F10.5 )
         45 FORMAT (1H0,25X,12H*** BODY NO.,I4,18H  INPUT VALUES ***// 15X,
           1 32HCENTER OF BODY COORDINATES   Y =, F16.6,5X, 3HZ =, F16.6//15X,
           2 7HYFLAG =,I3, 9H  ZFLAG =,I3,10X, 24HMODE SHAPE COEFFICIENT =,
           3 F16.6//15X,17HBODY BOX LIMITS =,2I5//)
         60 FORMAT (10X,22HINPUT VALUES FOR PANEL,I5)
         80 FORMAT ( 10X,33HNUMBER OF ELEMENTS FOR ALL PANELS)
        110 FORMAT (10X,I4,2X30HDIHEDRAL ANGLES FOR ALL PANELS )
        115 FORMAT (1H0,40X,I4,27H BODY ELEMENTS FOR BODY NO., I4/)
        120 FORMAT (10X, 5HPANEL,I4,2X,3HHAS,I4,22HZEE ELEMENTS - ZEE(I) )
        125 FORMAT (1H0,42X,I4,25H BODY RADII  FOR BODY NO.,   I4/)
        135 FORMAT (1H0,45X,I4,28H  X  ELEMENTS FOR ALL BODIES//)
        145 FORMAT (1H0,45X,I4,28H XIV ELEMENTS FOR ALL BODIES//)
        155 FORMAT (1H0,45X,I4,28H  Y  ELEMENTS FOR ALL BODIES//)
        165 FORMAT (1H0,45X,I4,28H  Z  ELEMENTS FOR ALL BODIES//)
        170 FORMAT (1H0,6E20.8)
        172 FORMAT (10X, I5, 1P8E14.6 )
        173 FORMAT ( 10X, I5, 24I4)
        175 FORMAT (1H0,45X,I4,28H DX  ELEMENTS FOR ALL BODIES//)
        180 FORMAT (10X, 5HPANEL,I4,2X,3HHAS,I4,28H CHORDWISE DIVISIONS - TH(I
           1))
        185 FORMAT (1H0,45X,I4,28H RAD ELEMENTS FOR ALL BODIES//)
        190 FORMAT (10X, 5HPANEL,I4,2X,3HHAS,I4,28H SPANWISE DIVISIONS - TAU(I
           1))
        195 FORMAT (1H0,45X,I4,30H X-DERIV OF RAD FOR ALL BODIES//)
        200 FORMAT (10X,5HPANEL,I4,5H  HAS,I4,15H  ELEMENTS WITH,I4,
           1 10H VERTICES.,/,10X,40HTHE X COORDINATES OF THESE VERTICES ARE  )
        210 FORMAT (10X,5HPANEL,I4,5H  HAS,I4,15H  ELEMENTS WITH,I4,
           1 10H VERTICES.,/,10X,40HTHE Y COORDINATES OF THESE VERTICES ARE  )
        215 FORMAT (10X,5HPANEL,I4,5H  HAS,I4,15H  ELEMENTS WITH,I4,
           1 10H VERTICES.,/,10X,40HTHE Z COORDINATES OF THESE VERTICES ARE  )
        220 FORMAT (10X,50HTHE FOLLOWING FIFTEEN VARIABLES ARE LISTED IN COLU
           X            ,22HMN FORMAT AND CONTAIN
           Y      ,/,10X,17HTHE SAME NUMBER (,I3,10H) OF ITEMS
           1      ,/,10X,50HCOLUMN  1, X ELEMENTS FOR ALL PANELS - X(I)
           2      ,/,10X,50HCOLUMN  2, XI-V ELEMENTS FOR ALL PANELS - EV(I)
           3      ,/,10X,50HCOLUMN  3, XI-1 ELEMENTS FOR ALL PANE'S - Z1(I)
           4      ,/,10X,50HCOLUMN  4, XI-2 ELEMENTS FOR ALL PANELS - Z2(I)
```

```
             5      ,/,10X,50HCOLUMN  5, Y ELEMENTS FOR ALL PANELS - Y(I)         PART1     515
             6      ,/,10X,50HCOLUMN  6, ETAV ELEMENTS FOR ALL PANELS   PV(I)     PART1     516
             7      ,/,10X,50HCOLUMN  7, ETA1 ELEMENTS FOR ALL PANELS - P1(I)     PART1     517
             8      ,/,10X,50HCOLUMN  8, ETA2 ELEMENTS FOR ALL PANELS - P2(I)     PART1     518
             9      ,/,10X,50HCOLUMN  9, Z ELEMENTS FOR ALL PANELS - ZZ(I)        PART1     519
             A      ,/,10X,50HCOLUMN 10, Z-V ELEMENTS FOR ALL PANELS - ZV(I)      PART1     520
             B      ,/,10X,50HCOLUMN 11, Z-1 ELEMENTS FOR ALL PANELS - ZZ1(I)     PART1     521
             C      ,/,10X,50HCOLUMN 12, Z-2 ELEMENTS FOR ALL PANELS - ZZ2(I)     PART1     522
             D      ,/,10X,51HCOLUMN 13, SDELX ELEMENTS FOR ALL PANELS - SDELX(I) PART1     523
             E      ,/,10X,50HCOLUMN 14, XOC ELEMENTS FOR ALL PANELS - XOC(I)     PART1     524
             F      ,/,10X,50HCOLUMN 15, BOX WIDTHS FOR ALL PANELS - DELY(I)    ) PART1     525
          330 FORMAT (10X, 5HPANEL,I4,2X,3HHAS,I4,2X,22HC.WIGGLES - CWIG(I)    )  PART1     526
          350 FORMAT (10X,51HTHE FOLLOWING FIVE VARIABLES ARE LISTED IN COLUMN F  PART1     527
             X              17HORMAT AND CONTAIN                                  PART1     528
             Y      ,/,10X,17HTHE SAME NUMBER (,I3, 10H) OF ITEMS                 PART1     529
             1      ,/,10X,41HCOLUMN 1,     Y-S FOR ALL STRIPS, YS(I)             PART1     530
             2      ,/,10X,41HCOLUMN 2, DELY-S FOR ALL STRIPS, DELYS(I)           PART1     531
             3      ,/,10X,41HCOLUMN 3,     Z-S FOR ALL STRIPS, ZS(I)             PART1     532
             4      ,/,10X,41HCOLUMN 4, DELZ-S FOR ALL STRIPS, DELZS(I)           PART1     533
             5      ,/,10X,41HCOLUMN 5,     T-S FOR ALL STRIPS, TS(I)    )        PART1     534
          390 FORMAT (10X, 5HPANEL,I4,2X,3HHAS,I4,2X,22HXI-J ELEMENTS - XIJ(I))   PART1     535
          430 FORMAT (10X,38HEND OF PART1 - BASIC DATA CALCULATIONS )             PART1     536
         1000 FORMAT (10X,61HBASIC GEOMETRIC DATA ASSOCIATED WITH ALL AERODYNAMI  PART1     537
             1C ELEMENTS)                                                         PART1     538
         1001 FORMAT (10X,1X,4H ROW,2X,5HCOL =,1(  1I3,1X, 3(1H-))                PART1     539
             1                                  ,7(  1I4,1X, 9(1H-)))             PART1     540
         1002 FORMAT (10X, I5, 1P8E14.6)                                          PART1     541
         2000 FORMAT (10X,51                                                      PART1     542
             1   HSURFACE AND BODY GEOMETRY AND ASSOCIATED PARAMETERS             PART1     543
             2       ,/10X,51(1H-))                                               PART1     544
      C                                                                           PART1     545
              RETURN                                                              PART1     546
              END                                                                 PART1     547
```

CARD NR.	SEVERITY	DETAILS	DIAGNOSIS OF PROBLEM
157	I		AN IF STATEMENT MAY BE MORE EFFICIENT THAN A 2 OR 3 BRANCH COMPUTED GO TO STATEMENT.
167	I		AN IF STATEMENT MAY BE MORE EFFICIENT THAN A 2 OR 3 BRANCH COMPUTED GO TO STATEMENT.
223	I		AN IF STATEMENT MAY BE MORE EFFICIENT THAN A 2 OR 3 BRANCH COMPUTED GO TO STATEMENT.
230	I		AN IF STATEMENT MAY BE MORE EFFICIENT THAN A 2 OR 3 BRANCH COMPUTED GO TO STATEMENT.
237	I		AN IF STATEMENT MAY BE MORE EFFICIENT THAN A 2 OR 3 BRANCH COMPUTED GO TO STATEMENT.
250	I		AN IF STATEMENT MAY BE MORE EFFICIENT THAN A 2 OR 3 BRANCH COMPUTED GO TO STATEMENT.
321	I		AN IF STATEMENT MAY BE MORE EFFICIENT THAN A 2 OR 3 BRANCH COMPUTED GO TO STATEMENT.
341	I		AN IF STATEMENT MAY BE MORE EFFICIENT THAN A 2 OR 3 BRANCH COMPUTED GO TO STATEMENT.
349	I		AN IF STATEMENT MAY BE MORE EFFICIENT THAN A 2 OR 3 BRANCH COMPUTED GO TO STATEMENT.
373	I		AN IF STATEMENT MAY BE MORE EFFICIENT THAN A 2 OR 3 BRANCH COMPUTED GO TO STATEMENT.

SYMBOLIC REFERENCE MAP (R=3)

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ENTRY POINTS      DEF LINE      REFERENCES
   3  PART1              1        545

VARIABLES      SN  TYPE             RELOCATION
  236   ACAP        REAL                 VARBLS     REFS       10       111
 3205   ATANA       REAL                            REFS      176       177
    1   BETA        REAL                 FLUTAN     REFS       20       111
  334   BGMA        REAL       ARRAY     BODY       REFS       30   DEFINED       409      410      411
   50   BR          REAL                 COMA       REFS       32
  237   B2          REAL                 VARBLS     REFS       10       111
 3202   COEF        REAL                            REFS      204   DEFINED       172
    0   COEFB       REAL       ARRAY      F.P.      REFS       26   DEFINED         1      412
 3170   COEFF       REAL                            REFS      126       127       401      412   DEFINED       125       400
    0   COEFP       REAL       ARRAY      F.P.      REFS       26   DEFINED         1      126       127
    0   CT1         REAL       ARRAY     P1GW       REFS       19   DEFINED       133
   62   CT2         REAL       ARRAY     P1GW       REFS       19   DEFINED       134
  372   CWIG        REAL       ARRAY     XYZ        REFS       16       307       309      324   DEFINED        84       307
12446   DELY        REAL       ARRAY     VARBLS     REFS       10       303       330      432      450
                                                 DEFINED      286       330       431
   62   DELYS       REAL       ARRAY     XYZ        REFS       16   DEFINED        90      303
 6024   DELZ        REAL       ARRAY                REFS       24       305       330  DEFINED        81       287
  226   DELZS       REAL       ARRAY     XYZ        REFS       16   DEFINED        89      305
 3211   DEL1        REAL                            REFS      204   DEFINED       185
 3210   DIFF21      REAL                            REFS      185   DEFINED       184
 3207   DIFF31      REAL                            REFS      204   DEFINED       183
 7346   EV          REAL       ARRAY     VARBLS     REFS       10       309       442  DEFINED       283       423
 6726   F           REAL       ARRAY                REFS       26       406     2*421    2*430   DEFINED        76       403
  310   FGAMMA      REAL       ARRAY     XYZ        REFS       16   DEFINED        86      311
  454   FGGAM       REAL       ARRAY     XYZ        REFS       16   DEFINED       312
  240   FL          REAL                 VARBLS     REFS       10       111
    0   FMACH       REAL                 FLUTAN     REFS       20       111
 3234   FNUM        REAL                            REFS      289   DEFINED       288
 3206   FOUR        REAL                            REFS      204   DEFINED       182
13514   GGMA        REAL       ARRAY     VARBLS     REFS       10       312   DEFINED      123
 3165   GGMAS       REAL                            REFS      123   DEFINED       122
  244   GMA         REAL       ARRAY     VARBLS     REFS       10       181       311  DEFINED        74       177       179
                                                     180
 3316   GMAS        REAL       ARRAY                REFS       24       352   DEFINED       75       181
 3157   I           INTEGER                         REFS       72        73        74       75        76        78        79
                                                      80       81        84        86       87        88        89        90
                                                     147      149       215       216      303       304       305       306
                                                     307      403       404       406      408       419       420       421
                                                     430      431       433   DEFINED       71        77        83        85
                                                     147      149       214       302      393       403       404       406
                                                     408      413       419
 3241   IC          INTEGER                         REFS    2*309   DEFINED       308
 3164   ILOOP       INTEGER                         REFS      119       126       127      130       132       133       134
                                                     140      141       158       168      177       179       180     2*181
                                                     224      231       238       251      311       312       322
                                                 DEFINED      118
 3225   IPNC        INTEGER                         REFS      216   DEFINED       215
 3253   IP1         INTEGER                         REFS      421       430       431      433   DEFINED       394       414
                                                     420
    5   IQ          INTEGER              VARBLS     REFS       10
    3   IR          INTEGER              CHEAD      REFS       40     2*378     4*382  DEFINED       154       164       220
                                                     247      318
    6   IRD         INTEGER              VARBLS     REFS       10
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VARIABLES       SN  TYPE            RELOCATION
 3200  IROWS        INTEGER                        REFS      156      166      222      229      236      249      320
                                                    340      348      372  DEFINED      369
 3155  ITAPER       INTEGER                     DEFINED       68  I/O REFS     122      124      125      147      149
                                                    399      400      403      404
    0  ITAPES       INTEGER     ARRAY   CTAPES     REFS       28       33       68       69
    7  ITAPET       INTEGER             CTABLE     REFS       37
 3156  ITAPEW       INTEGER                        REFS       97       99      113      121      136      159      169
                                                    225      232      239      252      323      343      351      364
                                                    366      375  DEFINED       69  I/O REFS     98      111      119
                                                    137      158      160      168      170      224      226      231
                                                    233      238      240      251      253      322      324      342
                                                    344      350      352      365      374      376      378      382
                                                    401      405      406      407      408      439      440      441
                                                    442      443      444      445      446      447      448      449
                                                    450      451      452      453
 3270  IVAR         INTEGER     ARRAY              REFS        5      378    2*382  DEFINED       54       55       56
                                                     57       58       59       60       61       62       63       64
                                                     65       66       67
 3244  IX           INTEGER                        REFS    3*333      334  DEFINED      332
 3251  IY         * INTEGER                     DEFINED      391
 3214  J            INTEGER                        REFS      204      206      208      216      217      242      243
                                                    271      272      273      277      279      281      288      301
                                                    303      304      305      306    2*307    2*309      311      312
                                                    418      421    2*422    2*423      424    2*425      426      427
                                                  2*428      429      430      431      432      433
                                                DEFINED      188      213      217      262      297      417
 3161  JBEGIN       INTEGER                        REFS      213      242      245      257  DEFINED       92      257
 3201  JC           INTEGER                        REFS      160      170      226      233      240      253      324
                                                    344      352      376      378      382  DEFINED      160      170
                                                    226      233      240      253      324      344      352      376
                                                    378      382
    4  JCL          INTEGER             CHEAD      REFS       40    2*160    2*170    2*226    2*233    2*240      253
                                                    324    2*344    2*352      376      378      382
 3246  JCOLS        INTEGER                        REFS      372      378      382  DEFINED      370
 3226  JCOUNT       INTEGER                        REFS      251  DEFINED      242
    5  JCU          INTEGER             CHEAD      REFS       40      160      170      226      233      240      253
                                                    324      344      352      376    2*378      380      381      382
                                                DEFINED      153      163      219      245      317
    0  JCUM         INTEGER             F.P.       REFS      291      292      320  DEFINED        1       93      314
 3247  JCU1         INTEGER                        REFS      382  DEFINED      380
 3250  JCU2         INTEGER                        REFS      382  DEFINED      381
 3227  JEND         INTEGER                        REFS      249  DEFINED      243
 3237  JIX          INTEGER                        REFS      298  DEFINED      296      298
 3222  JLIMIT       INTEGER                        REFS      212      222      224      229      231      236      238
                                                    365      369      392      455  DEFINED      210      356
 3255  JL1          INTEGER                        REFS      415      417  DEFINED      396      435
 3265  JL2          INTEGER                        REFS      416      417      435  DEFINED      415
    7  JSPECS       INTEGER             VARBLS     REFS       10
 3242  JY           INTEGER                        REFS    3*330  DEFINED      329
 3233  J1           INTEGER                        REFS      271      272      273    2*274    2*275    2*276      277
                                                    278      279      280      281      282    3*283    3*284    2*285
                                                  3*286    3*287      289      297      317  DEFINED      263      291
 3235  J2           INTEGER                        REFS      297      314  DEFINED      292
 3230  J3           INTEGER                        REFS      253      254      324      325  DEFINED      246      254
                                                    316      325
 3215  K            INTEGER                        REFS      271      277      288    3*399    2*400    3*401      405
                                                    407      409      410      411      412      437
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VARIABLES      SN  TYPE            RELOCATION
                                                   DEFINED      192        268        398
     7  KBPAGE     INTEGER               CLIST       REFS        35
  3254  KCUM       INTEGER                           REFS       436        437        439        441        443        445        447
                                                      449       451        452    DEFINED        395        436
  3267  KF         INTEGER                           REFS       432        433        452    DEFINED        418        452
     0  KHEAD      INTEGER               CHEAD       REFS        40        157        167        223        230        237        250
                                                      321       341        349        373
  3217  KL         INTEGER                           REFS       271        278        288        440        442        444        446
                                                      448       450    DEFINED        200        270        440        442        444
                                                      446       448        450
     4  KLABEL     INTEGER               CLIST       REFS        35
  3256  KL1        INTEGER                           REFS       440        442        444        446        448        450
                                                   DEFINED      397
  3266  KL2        INTEGER                           REFS       440        442        444        446        448        450
                                                   DEFINED      416
     2  KOLUMN     INTEGER               CHEAD       REFS        40        254        325        337        338
                                                   DEFINED      106        107        338        346
     0  KOUNT      INTEGER               CLIST       REFS        35         95        100        112        120        135        361
                                                      363   DEFINED         95        100        112        120        135        361
                                                      363
    11  KOUNTH     INTEGER               CLIST       REFS        35
    12  KOUNTI     INTEGER               CLIST       REFS        35
     1  KPAGE      INTEGER               CLIST       REFS        35
   242  KR         REAL                  VARBLS      REFS         3         10
   243  KRDBR      REAL                  VARBLS      REFS         3         10
     0  KREPOR     INTEGER               REPORT      REFS        39        107
     1  KRETUR     INTEGER               CHEAD       REFS        40        161        171        227        234        241        255
                                                      326       345        353        385    DEFINED        155        165        221
                                                      248       319        339        371
  3245  KSAVE      INTEGER                           REFS       346    DEFINED        337
  3236  KT         INTEGER                           REFS       299        300        301    DEFINED        295        299
     0  KTABLE     INTEGER               CTABLE      REFS        37    DEFINED        103
     5  KTABLO     INTEGER               CTABLE      REFS        37
     5  KTPAGE     INTEGER               CLIST       REFS        35
  3240  KTP1       INTEGER                           REFS       301    DEFINED        300
  3216  L          INTEGER                           REFS       271        272        273        278        280        282        288
                                                   DEFINED      196        269
     0  LC         INTEGER     ARRAY     COMA        REFS         8         32        335        359
  3223  LIM1       INTEGER                           REFS       214        219    DEFINED        211
  3224  LIM2       INTEGER                           REFS       214    DEFINED        212
     2  LINES      INTEGER               CLIST       REFS        35       2*95      2*361
    10  LINESG     INTEGER               CLIST       REFS        35
     3  LINEST     INTEGER               CLIST       REFS        35
  3163  LOOP       INTEGER                           REFS       118      3*122        123    DEFINED        116
     7  LSKIP      INTEGER               CHEAD       REFS        40    DEFINED        151
     6  LSUB       INTEGER               CHEAD       REFS        40        361        363    DEFINED        152        360        368
     0  LTSHF      INTEGER               CTSHF       REFS        34        156        166        222        229        236        249
                                                      320       340        348        372
  3212  M          INTEGER                           REFS       188        192        196        200      2*204        262        263
                                                      268       269        270        302        308    DEFINED        186        260
                                                      293       310
   360  MRK        INTEGER     ARRAY     BODY        REFS        30      2*401    DEFINED      2*400
  3213  N          INTEGER                           REFS       188        192        196        200        204        205        207
                                                      262       263        268        269        270        302        308        310
                                                      313   DEFINED        187        261        294        313
     1  NB         INTEGER               VARBLS      REFS        10        389        398
  3243  NBA        INTEGER                           REFS       322    DEFINED        321        324
```

```
VARIABLES      SN  TYPE          RELOCATION
   154  NBARAY     INTEGER    ARRAY    VARBLS      REFS       10      334      344   DEFINED      333
   310  NBEA       INTEGER    ARRAY    BODY        REFS       30  DEFINED      437
  3252  NBOX       INTEGER                         REFS      396      397      418   DEFINED      392
  3167  NC         INTEGER                         REFS      137      139      140      143      147      158      188
                                                    192      196      200      210      214      215      262      263
                                                    268      269      270  DEFINED      125
    10  NCARAY     INTEGER    ARRAY    VARBLS      REFS       10      333  DEFINED      140
  3175  NCEND      INTEGER                         REFS      156      186      258   DEFINED      143
  3231  NCM1       INTEGER                         REFS      260      294      313   DEFINED      258
     0  NCNSM1     INTEGER             VARBLS      REFS       10      224      231      238      328
                                                DEFINED      139      357      455
     3  NCOLS      INTEGER             CTABLE      REFS       37  DEFINED      102
     4  NCOLST     INTEGER             CTABLE      REFS       37
  3174  NCRUN      INTEGER                         REFS      153      186      260   DEFINED      142
     3  NDATA      INTEGER             VARBLS      REFS       10
     2  NDELT      INTEGER             VARBLS      REFS       10      137
  3154  NELEMD     INTEGER                         REFS       53  DEFINED       52
  3261  NF         INTEGER                         REFS      402      403      404      405      406      407      408
                                                DEFINED      400
  3264  NFM1       INTEGER                         REFS      415      436  DEFINED      402
  3153  NLISTD     INTEGER                         REFS       53      370  DEFINED       51
     4  NOPAN      INTEGER             VARBLS      REFS       10      116      137      332      340      348      350
     6  NPAGE      INTEGER             CLIST       REFS       35
     6  NPAGEA     INTEGER             CTABLE      REFS       37
     1  NPASS      INTEGER             CTABLE      REFS       37
     2  NROWS      INTEGER             CTABLE      REFS       37  DEFINED      101
    57  NRVBO      INTEGER             FLUTAN      REFS       20
  3166  NS         INTEGER                         REFS      137      139      141      145      149      168      210
                                                    257  DEFINED      125
    72  NSARAY     INTEGER    ARRAY    VARBLS      REFS       10      333  DEFINED      141
  3177  NSEND      INTEGER                         REFS      166      187      259   DEFINED      145
  3232  NSM1       INTEGER                         REFS      261      292      322   DEFINED      259
  3160  NSOFAR     INTEGER                         REFS      263      293      294      328      329      356      357
                                                DEFINED       91      115      328
  3176  NSRUN      INTEGER                         REFS      163      187      261   DEFINED      144
  3263  NY         INTEGER                         REFS      401      410      411   DEFINED      400
  3262  NZ         INTEGER                         REFS      401      411  DEFINED      400
   241  PI         REAL                VARBLS      REFS       10      123      179      180      181      410
                                                DEFINED       70
  4220  PNU        REAL       ARRAY                REFS       24      233    2*272      279      280
                                                DEFINED       79      206
  3220  PNUP       REAL                            REFS      206  DEFINED      205
 10166  PV         REAL       ARRAY    VARBLS      REFS       10  DEFINED      284      426
  3426  P1         REAL       ARRAY    VARBLS      REFS       10      284      286   DEFINED      279
  5706  P2         REAL       ARRAY    VARBLS      REFS       10      284      286   DEFINED      280
  6644  RAD        REAL       ARRAY                REFS       24      408    2*431    2*433  DEFINED      404
    40  RVBO       REAL       ARRAY    FLUTAN      REFS       20       23
     0  RO         REAL       ARRAY    BODY        REFS       30  DEFINED      432
   144  ROP        REAL       ARRAY    BODY        REFS       30      452  DEFINED      433
 11626  SDELX      REAL       ARRAY    VARBLS      REFS       10      307      433      448  DEFINED      289      430
  3162  SMALL      REAL                            REFS      175  DEFINED      114
  5742  TAU        REAL       ARRAY                REFS       24      170      204      205      207    2*301
                                                DEFINED       73      149
  5660  TH         REAL       ARRAY                REFS       24      160    2*204  DEFINED       72      147
   144  TS         REAL       ARRAY    P1GW        REFS       19  DEFINED      301
     1  TSHF       REAL       ARRAY    CTSHF       REFS        6       34      156      166      222      229      236
                                                    249      320      340      348      372
```

```
VARIABLES      SN  TYPE            RELOCATION
   326  VAR         REAL       ARRAY     VARBLS       REFS         7         42         53        378      2*382
     2  VBO         REAL       ARRAY     FLUTAN       REFS        20         23
   326  X           REAL       ARRAY     VARBLS       REFS        10         42        274        422        423        440
                                                   DEFINED       271        421
     0  XA          REAL       ARRAY     MODV         REFS        21    DEFINED        274        422
   430  XBO         REAL       ARRAY     BODY         REFS        30    DEFINED        399
  3306  XCAP        REAL       ARRAY                  REFS        24        128      2*133      2*134      4*137      4*182      2*183
                                                     2*184   DEFINED      4*124
   620  XIJ         REAL       ARRAY     XXZ          REFS        18        253        309    DEFINED        216
     0  XOC         REAL       ARRAY     XXZ          REFS        18        382    DEFINED        309
 13266  XO          REAL       ARRAY     VARBLS       REFS        10    DEFINED        122
  3171  X1          REAL                              REFS       204    DEFINED        128
  1146  Y           REAL       ARRAY     VARBLS       REFS        10        275        304        425        444
                                                   DEFINED       272        424
   620  YA          REAL       ARRAY     MODV         REFS        21    DEFINED        275        425
   454  YBO         REAL       ARRAY     BODY         REFS        30    DEFINED        399
  3312  YCAP        REAL       ARRAY                  REFS        24        129      2*137      2*173    DEFINED      2*124
  3203  YDIF        REAL                              REFS       175        176        205    DEFINED        173
     0  YIN         REAL       ARRAY      F.P.        REFS        27    DEFINED          1        130
     0  YS          REAL       ARRAY     XYZ          REFS        16    DEFINED         87        304
  3260  YSC         REAL                              REFS       401        424        426    DEFINED        400
 13350  YO          REAL       ARRAY     VARBLS       REFS        10    DEFINED        122
  3172  Y1          REAL                              REFS       130        206    DEFINED        129
  1440  ZA          REAL       ARRAY     MODV         REFS        21    DEFINED        276        428
   500  ZBO         REAL       ARRAY     BODY         REFS        30    DEFINED        399
  3314  ZCAP        REAL       ARRAY                  REFS        24        131      2*137      2*174    DEFINED      2*125
  3204  ZDIF        REAL                              REFS       176        180        207    DEFINED        174
  5040  ZEE         REAL       ARRAY                  REFS        24        240      2*273        281        282
                                                   DEFINED        80        208
  3221  ZEEP        REAL                              REFS       208    DEFINED        207
  3173  ZEE1        REAL                              REFS       132        208    DEFINED        131
  3152  ZERO        REAL                              REFS        53    DEFINED         50
  3400  ZETA        REAL       ARRAY                  REFS        24      2*216        226      4*271      2*277      2*278      4*288
                                                   DEFINED        78        204
     0  ZIN         REAL       ARRAY      F.P.        REFS        27    DEFINED          1        132
   144  ZS          REAL       ARRAY     XYZ          REFS        16    DEFINED         88        306
  3257  ZSC         REAL                              REFS       401        427        429    DEFINED        400
 11006  ZV          REAL       ARRAY     VARBLS       REFS        10    DEFINED        285        429
  1766  ZZ          REAL       ARRAY     VARBLS       REFS        10        276        285        306        428        446
                                                   DEFINED       273        427
  4246  ZZ1         REAL       ARRAY     VARBLS       REFS        10        287    DEFINED        281
  6526  ZZ2         REAL       ARRAY     VARBLS       REFS        10        287    DEFINED        282
 13432  ZO          REAL       ARRAY     VARBLS       REFS        10    DEFINED        122
  2606  Z1          REAL       ARRAY     VARBLS       REFS        10        283    DEFINED        277
  5066  Z2          REAL       ARRAY     VARBLS       REFS        10        283    DEFINED        278
        VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS          TYPE    ARGS        REFERENCES
        ATAN3                3              176
        DVALUE               3               53
        HEAD                 4              156        166        222        229        236        249        320        340        348
                                            372
        PLB                  3               97         99        113        121        136        159        169        225        232
                                            239        252        323        343        351        364        366        375
        PROGNA               2               94
        PTABLE               3              104
        SQRT        REAL     1  LIBRARY     330
```

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EXTERNALS          TYPE   ARGS        REFERENCES
       TITLES              1               96       117       362

INLINE FUNCTIONS   TYPE   ARGS        DEF LINE  REFERENCES
       ABS        REAL     1  INTRIN               175       286       287       430
       MINOF      INTEGER  2    SF          46

STATEMENT LABELS                DEF LINE   REFERENCES
  2316  10      FMT               460         122       124       147       149       399       403       404
  1137  11                        355         335
  1267  12                        387         359
  2320  25      FMT               461         125
  2324  30      FMT               462         137
  2355  35      FMT               471         400
  2361  40      FMT               472         111
  2406  45      FMT               477         401
  2434  60      FMT               481         119
  2441  80      FMT               482         342
  2447  110     FMT               483         350
  2455  115     FMT               484         405
  2463  120     FMT  NO REFS      485
  2471  125     FMT               486         407
  2477  135     FMT               487         439
  2505  145     FMT               488         441
  2513  155     FMT               489         443
  2521  165     FMT               490         445
  2527  170     FMT               491         406       408       440       442       444       446       448       450       452
  2532  172     FMT               492         160       170       226       233       240       253       324       352
  2535  173     FMT               493         344
  2540  175     FMT               494         447
  2546  180     FMT               495         158
  2555  185     FMT               497         449
  2563  190     FMT               498         168
  2572  195     FMT               500         451
  2600  200     FMT               501         224
  2614  210     FMT               503         231
  2630  215     FMT               505         238
  2644  220     FMT               507         365
  3007  330     FMT               525         322
  3016  350     FMT  NO REFS      526
  3063  390     FMT               534         251
  3072  430     FMT               535         453
     0  450         INACTIVE       71
     0  460                        76          71
     0  470                        82          77
     0  480                        84          83
     0  490                        90          85
   234  505                       156         161
   246  506                       158         157
   250  507                       159         157
   252  508                       160         157
   266  515                       166         171
   300  516                       168         167
   302  517                       169         167
   304  518                       170         167
   437  525                       222         227
   451  526                       224         223
   453  527                       225         223
```

```
STATEMENT LABELS              DEF LINE   REFERENCES
  455  528                       226        223
  466  535                       229        234
  500  536                       231        230
  502  537                       232        230
  504  538                       233        230
  332  540                       179        175
  515  545                       236        241
  527  546                       238        237
  531  547                       239        237
  533  548                       240        237
  336  550                       181        178
  553  555                       249        255
  565  556                       251        250
  567  557                       252        250
  571  558                       253        250
    0  560                       209        186        187
    0  570                       217        214
    0  603                       307        302
    0  604                       290        260        261
  773  605                       320        326
 1006  606                       322        321
 1010  607                       323        321
 1012  608                       324        321
    0  610                       309        308
 1057  615                       340        345
 1071  616                       342        341
 1073  617                       343        341
 1075  618                       344        341
    0  620                       313        297
 1110  625                       348        353
 1122  626                       350        349
 1124  627                       351        349
 1126  628                       352        349
    0  630                       328        116
 1164  635                       372        385
 1176  636                       374        373
 1200  637                       375        373
 1213  638                       377        373
    0  640                       330        329
    0  660                       334        332
    0  900                       434        417
    0  908                       438        398
 1532  910                       454        389
 3100  1000    FMT               536        374
 3110  1001    FMT               538        376
 3117  1002    FMT               540        378        382
 3122  2000    FMT               541         98

LOOPS  LABEL   INDEX    FROM-TO    LENGTH   PROPERTIES
   41  460     I         71 76       4B      INSTACK
   51  470     I         77 82       4B      INSTACK
   60  480     I         83 84       2B      INSTACK
   66  490     I         85 90       4B      INSTACK
  135  630     LOOP     116 328    674B               EXT REFS  NOT INNER
  352  560     M        186 209     41B               NOT INNER
  366  560     N        187 209     22B        OPT
```

```
LOOPS  LABEL   INDEX    FROM-TO    LENGTH   PROPERTIES
  612  604     M        260 290      73B             NOT INNER
  624  604     N        261 290      55B        OPT
  715  620     J        297 313      51B             NOT INNER
  731  603     I        302 307      10B        OPT
  750  610     IC       308 309       4B    INSTACK
 1032  640     JY       329 330       7B             EXT REFS
 1045  660     IX       332 334       5B    INSTACK
 1206          JC       376 376       4B             EXT REFS
 1221          JC       378 378      12B             EXT REFS
 1244          JC       382 382      12B             EXT REFS
 1276  908     K        398 438     136B             EXT REFS  NOT INNER
 1401  900     J        417 434      23B        OPT

COMMON BLOCKS  LENGTH   MEMBERS - BIAS NAME(LENGTH)
       VARBLS    6014              0 NCNSM1 (1)           1 NB     (1)           2 NDELT  (1)
                                   3 NDATA  (1)           4 NOPAN  (1)           5 IQ     (1)
                                   6 IRD    (1)           7 JSPECS (1)           8 NCARAY (50)
                                  58 NSARAY (50)        108 NBARAY (50)        158 ACAP   (1)
                                 159 B2     (1)         160 FL     (1)         161 PI     (1)
                                 162 KR     (1)         163 KRDBR  (1)         164 GMA    (50)
                                 214 X      (400)       614 Y      (400)      1014 ZZ     (400)
                                1414 Z1     (400)      1814 P1     (400)      2214 ZZ1    (400)
                                2614 Z2     (400)      3014 P2     (400)      3414 ZZ2    (400)
                                3814 EV     (400)      4214 PV     (400)      4614 ZV     (400)
                                5014 SDELX  (400)      5414 DELY   (400)      5814 XO     (50)
                                5864 YO     (50)       5914 ZO     (50)       5964 GGMA   (50)
       XYZ        350              0 YS     (50)         50 DELYS  (50)        100 ZS     (50)
                                 150 DELZS  (50)        200 FGAMMA (50)        250 CWIG   (50)
                                 300 FGGAM  (50)
       XXZ        450              0 XOC    (400)       400 XIJ    (50)
       P1GW       150              0 CT1    (50)         50 CT2    (50)        100 TS     (50)
       FLUTAN      48              0 FMACH  (1)           1 BETA   (1)           2 VBO    (30)
                                  32 RVBO   (15)         47 NRVBO  (1)
       MODV      1200              0 XA     (400)       400 YA     (400)       800 ZA     (400)
       BODY       340              0 RO     (100)       100 ROP    (100)       200 NBEA   (20)
                                 220 BGMA   (20)       .240 MRK    (40)        280 XBO    (20)
                                 300 YBO    (20)        320 ZBO    (20)
       COMA        41              0 LC     (40)         40 BR     (1)
       CTAPES      50              0 ITAPES (50)
       CTSHF        2              0 LTSHF  (1)           1 TSHF   (1)
       CLIST       11              0 KOUNT  (1)           1 KPAGE  (1)           2 LINES  (1)
                                   3 LINEST (1)           4 KLABEL (1)           5 KTPAGE (1)
                                   6 NPAGE  (1)           7 KBPAGE (1)           8 LINESG (1)
                                   9 KOUNTH (1)          10 KOUNTI (1)
       CTABLE       8              0 KTABLE (1)           1 NPASS  (1)           2 NROWS  (1)
                                   3 NCOLS  (1)           4 NCOLST (1)           5 KTABLO (1)
                                   6 NPAGEA (1)           7 ITAPET (1)
       REPORT       1              0 KREPOR (1)
       CHEAD        8              0 KHEAD  (1)           1 KRETUR (1)           2 KOLUMN (1)
                                   3 IR     (1)           4 JCL    (1)           5 JCU    (1)
                                   6 LSUB   (1)           7 LSKIP  (1)

 EQUIV CLASSES  LENGTH  MEMBERS - BIAS NAME(LENGTH)
NCNSM1 X         5600              0 VAR    (5600)      400 Y      (400)       800 ZZ     (400)
                                1200 Z1     (400)      1600 P1     (400)      2000 ZZ1    (400)
                                2400 Z2     (400)      2800 P2     (400)      3200 ZZ2    (400)
                                3600 EV     (400)      4000 PV     (400)      4400 ZV     (400)
```

```
C
      YY(NFB) =  X(J)
      B(NFB) = EV(J)
      LL(NFB) = J
    8 CONTINUE
      IF (NFB.EQ.0)  GO TO 120
      CALL HELGA (B,AN,NFB,50,XAT,DEFL,NPT,NPL,50,0,0)
      DO 99 J = 1,NFB
      LLL = LL(J)
      IF (ABS(AN(J,1)) .LE. 1.0E-05) AN(J,1) = 0.0
      L1L = LLL - NTBOX
   99 BQ(L1L) = SDELX(LLL)*DELY(LLL)*AN(J,1) / B22
      CALL HELGA (YY,AN,NFB,50,XAT,DEFL,NPT,NPL,50,0,1)
      DO 9 J = 1,NFB
      LLL = LL(J)
      IF (ABS(AN(J,1)) .LE. 1.0E-05) AN(J,1) = 0.0
      IF (ABS(AN(J,2)) .LE  1.0E-07) AN(J,2) = 0.0
      L1L = LLL - NTBOX
      H(L1L)  = AN(J,1)
      DH1(L1L)= AN(J,2) * B2
C
C LIST INTERPOLATED MODE SHAPES
C
      IF (KLNN .EQ. 0) GO TO 310
      CALL TITLES (2)
      IF (KOUNT .EQ. KOUNTS) GO TO 200
      IF (KOUNT .GT. KOUNTH) GO TO 250
  200 CONTINUE
      KOUNTS = -1
      IF ((LINES-KOUNT) .LT. 4) KOUNT = LINES
      CALL TITLES (2)
      WRITE (ITAPEW,2300)
      CALL PLB (1,1,ITAPEW)
      KOUNT  =  KOUNT + 3
  250 CONTINUE
      KOUNT  =  KOUNT + 1
      WRITE (ITAPEW,2500) LLL, X(LLL), Y(LLL), H(L1L), DH1(L1L)
  310 CONTINUE
    9 CONTINUE
  120 CONTINUE
C
      CALL RNRW (ITAPE, BQ,NBOXS)
      CALL RNRW (ITAPE,  H,NBOXS)
  570 CALL RNRW (ITAPE,DH1,NBOXS)
      REWIND MTAP16
C
C
C FORMATS
C
C
   50 FORMAT (20X,16HCONTROL SURFACES/)
   51 FORMAT (//3X,24HTERMINAL POINTS OF LINE ,I5,2X,13HIN INCHES ARE/
     1          6X,4HX(1),9X,4HY(1),9X,4HX(2),9X,4HY(2)/
     2          4(2X,E12.5)/)
   52 FORMAT ( 3X,23HNO. OF POINTS ON LINE =,I5/
     1          3X,37HCOORDINATES OF POINTS (IN INCHES) ARE/
```

```
      CALL PLB (1,1,ITAPEW)                                             MODAL     287
      KOUNT  =  KOUNT +4                                                MODAL     288
      KOUNTS = KOUNT                                                    MODAL     289
      NROWS  =  0                                                       MODAL     290
      NCOLS  =  2                                                       MODAL     291
      KTABLE =  2                                                       MODAL     292
      CALL PTABLE (2,58,TITLE)                                          MODAL     293
  100 CONTINUE                                                          MODAL     294
   11 CALL RNRW (-MTAP16,A,LPT)                                         MODAL     295
C                                                                       MODAL     296
C     SEARCH ALL NEW KNOWN POINTS, SELECTING THOSE WITH THE SAME Y AS   MODAL     297
C     THE PANEL IN QUESTION.  THESE BECOME THE KNOWN POINTS CHORDWISE.  MODAL     298
C                                                                       MODAL     299
      NSB = 0                                                           MODAL     300
      R = 0.0                                                           MODAL     301
      IU = 1                                                            MODAL     302
      YU(1) = 0.0                                                       MODAL     303
      DO 120 I = 1,NBOXS                                                MODAL     304
      MBOX    = NTBOX + I                                               MODAL     305
      YS      = Y(MBOX)                                                 MODAL     306
      IF (YS.EQ.R) GO TO 120                                            MODAL     307
      DO 301 NU = 1,IU                                                  MODAL     308
      RU = YU(NU)                                                       MODAL     309
      IF (YS.EQ.RU) GO TO 120                                           MODAL     310
  301 CONTINUE                                                          MODAL     311
      IU = IU + 1                                                       MODAL     312
      YU(IU) = YS                                                       MODAL     313
      NSB = NSB + 1                                                     MODAL     314
      R       = YS                                                      MODAL     315
      IF ( .NOT. WILK )        GO TO 36                                 MODAL     316
      DO 32 II = 1,NCF                                                  MODAL     317
      IF (R.GE.Y1(II).AND.R.LE.Y2(II)) GO TO 36                         MODAL     318
   32 CONTINUE                                                          MODAL     319
      GO TO 120                                                         MODAL     320
   36 NPT      =  0                                                     MODAL     321
      DO 5 J = 1,LPT                                                    MODAL     322
      IF (YX(J) .NE. R) GO TO 5                                         MODAL     323
      NPT = NPT + 1                                                     MODAL     324
      XAT(NPT) = XX(J)                                                  MODAL     325
      DEFL (NPT,1) =  A(J)                                              MODAL     326
    5 CONTINUE                                                          MODAL     327
      NGPI = NPT                                                        MODAL     328
      NPL = MINO (4,NPT)                                                MODAL     329
C                                                                       MODAL     330
C     SEARCH ALL PANELS, SELECTING  THOSE WHERE Y=R. THESE BECOME THE   MODAL     331
C     UNKNOWNS CHORDWISE.  NFB COUNTS THESE UNKNOWNS.                   MODAL     332
C                                                                       MODAL     333
      NFB = 0                                                           MODAL     334
      DO 8 II    = 1,NBOXS                                              MODAL     335
      J = NTBOX + II                                                    MODAL     336
      IF  (Y(J) .NE. R) GO TO 8                                         MODAL     337
      IF   (.NOT.WILK)   GO TO 35                                       MODAL     338
      IF (X(J) .LT. XC(NSB)) GO TO 8                                    MODAL     339
   35 NFB = NFB + 1                                                     MODAL     340
C                                                                       MODAL     341
C     YY - RECEIVING POINT                                              MODAL     342
C     R - SENDING POINT                                                 MODAL     343
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```
      DO 30 II= 1,NCF
      IF (YS.GE.Y1(II).AND.YS.LE Y2(II)) GO TO 31
   30 CONTINUE
      GO TO 876
   31 NFP     = NFP + 1
      YY(NFP) = YS
  876 R       = YS
      IF ( NFP  EQ. 0 )  GO TO 875
      CALL HELGA (YY,AN,NFP,50,XAT,DEFL,NGPI,NGPL,50,0,0)
C
C     THE INTERPOLATION IS DONE; THE RESULTING DEFLECTIONS ARE AN.
C     NPT IS THE SUM OF NFP OVER ALL NLINES.
C     THESE POINTS NOW BECOME THE KNOWN POINTS. X'S ARE CALCULATED.
C
      DO 6 LM = 1,NFP
      NPT = NPT + 1
      IF (M.GT.1) GO TO 7
      YX(NPT) = YY(LM)
       R      =    YX (NPT)
      XX(NPT) = XTERM1(KL) + (R-YTERM1(KL))*ZEL(KL)
    7 A(NPT) = AN(LM,1)
      IF (ABS( A(NPT))  .LE.  1.0E-07)  A(NPT)   = 0.0
    6 CONTINUE
  875 CONTINUE
      LPT    =    NPT
      CALL RNRW(MTAP16,A,LPT)
  150 CONTINUE
      REWIND MTAP49
      REWIND MTAP16
C
C     CHORDWISE INTERPLOATION
C
      KDEG = NICH
      IF (KLNN .EQ. 0) GO TO 123
      CALL TITLES(2)
      CALL PLB (1,2,ITAPEW)
      WRITE (ITAPEW,4000)
      CALL PLB (1,1,ITAPEW)
      KOUNT  =  KOUNT + 5
      NROWS  =  1
      NCOLS  =  0
      KTABLE =  2
      CALL PTABLE (2,51,51
     1   HINTERPOLATED MODES FOR PRIMARY AND CONTROL SURFACES)
  123 CONTINUE
      DO 570 M=1,NMODES
      IF (KLNN .EQ. 0) GO TO 100
      REWIND ITAP18
      IF (KSURFT .EQ. 1) WRITE (ITAP18,2000) NSURF, M
      IF (KSURFT .EQ. 2) WRITE (ITAP18,2050) NSURF, M
      REWIND ITAP18
      READ (ITAP18,3000) TITLE
      IF ((LINES-KOUNT)  .LT. 4) KOUNT = LINES
      CALL TITLES (2)
      CALL PLB (1,2,ITAPEW)
      IF (KSURFT .EQ. 1) WRITE (ITAPEW,2100) NSURF, M
      IF (KSURFT .EQ. 2) WRITE (ITAPEW,2150) NSURF, M
```

```
   17 CONTINUE                                                          MODAL     173
   24 IF  (M.NE.NMODES) JB = JB - NGPO                                  MODAL     174
      NPOINT = JB                                                       MODAL     175
      IF (NMPT.EQ.O) GO TO 20                                           MODAL     176
C                                                                       MODAL     177
C     PRINTOUT DEFLECTIONS AT GIVEN POINTS.                             MODAL     178
C                                                                       MODAL     179
C                                                                       MODAL     180
C                                                                       MODAL     181
      DO 60 J = 1,NLINES                                                MODAL     182
      NGPI = NGP(J)                                                     MODAL     183
      DO 60 K = 1,NGPI                                                  MODAL     184
C                                                                       MODAL     185
      LINE = LINE + 1                                                   MODAL     186
      IF (LINE.GT.50) LINE = O                                          MODAL     187
      IF (LINE.NE.O) GO TO 60                                           MODAL     188
      WRITE (ITAPEW,400) NF                                             MODAL     189
      WRITE (ITAPEW,450) M                                              MODAL     190
   60 WRITE (ITAPEW,82) J , K , DEF(K,J)                                MODAL     191
C                                                                       MODAL     192
C                                                                       MODAL     193
   20 NPT = O                                                           MODAL     194
C                                                                       MODAL     195
C     SPANWISE INTERPOLATION ALONG GIVEN LINES                          MODAL     196
C                                                                       MODAL     197
      DO 875 KL=1,NLINES                                                MODAL     198
      NGPI=NGP(KL)                                                      MODAL     199
C                                                                       MODAL     200
C     ASSIGN ARGUMENTS AND DEFLECTIONS AT GIVEN POINTS.                 MODAL     201
C                                                                       MODAL     202
      DO 22 I = 1,NGPI                                                  MODAL     203
      XAT(I) = YGP(I,KL)                                                MODAL     204
   22 DEFL(I,1) = DEF(I,KL)                                             MODAL     205
      NGPL = MINO (4,NGPI)                                              MODAL     206
      NFP = O                                                           MODAL     207
C                                                                       MODAL     208
C     SEARCH PANEL Y'S PICKING OUT THOSE THAT FALL ON A                 MODAL     209
C     PANEL OF THE GIVEN LINE.  THE SELECTED POINTS ARE NUMBERED NFP.   MODAL     210
C     ASSUMES PANELS ARE ARRANGED BY CHORD.                             MODAL     211
C                                                                       MODAL     212
            R      =   0.0                                              MODAL     213
      IU = 1                                                            MODAL     214
      YU(1) = 0.0                                                       MODAL     215
      DO 876   MM  =  1,NBOXS                                           MODAL     216
      MBOX     = NTBOX + MM                                             MODAL     217
      YS       = Y(MBOX)                                                MODAL     218
      IF (YS.EQ.R)                         GO TO 876                    MODAL     219
      DO 300 NU = 1,IU                                                  MODAL     220
      RU = YU(NU)                                                       MODAL     221
      IF (YS.EQ.RU) GO TO 876                                           MODAL     222
  300 CONTINUE                                                          MODAL     223
      IU = IU + 1                                                       MODAL     224
      YU(IU) = YS                                                       MODAL     225
      R = YS                                                            MODAL     226
      IF (R.LT.YTERM1(KL))                  GO TO 876                   MODAL     227
      IF (R.GT.YTERM2(KL))                  GO TO 876                   MODAL     228
      IF ( NOT WILK)                        GO  TO 31                   MODAL     229
```

```
      ZEL(I)  = (XTERM2(I)-XTERM1(I)) / (YTERM2(I)-YTERM1(I))              MODAL     116
      NGPI=NGP(I)                                                          MODAL     117
      DO 10 J=1,NGPI                                                       MODAL     118
      LINE = LINE + 1                                                      MODAL     119
      IF (NMPT.EQ.0) GO TO 18                                              MODAL     120
      WRITE (ITAPEW,718) J,XGP(J,I),YGP(J,I)                               MODAL     121
   18 CONTINUE                                                             MODAL     122
   10 CONTINUE                                                             MODAL     123
    1 CONTINUE                                                             MODAL     124
C                                                                          MODAL     125
C     INTERPOLATE TO GET INTERMEDIATE DEFL. ON GIVEN LINES                 MODAL     126
C                                                                          MODAL     127
      KDEG = NISP                                                          MODAL     128
      REWIND MTAP49                                                        MODAL     129
      DO 150 M=1,NMODES                                                    MODAL     130
      CALL RNRW (-MTAP49,QZ,NC)                                            MODAL     131
      LINE = 0                                                             MODAL     132
      IF (NMPT.EQ.0) GO TO 862                                             MODAL     133
      WRITE (ITAPEW,400) NF                                                MODAL     134
      WRITE (ITAPEW,450) M                                                 MODAL     135
  862 JB = NPOINT                                                          MODAL     136
      IF (NELAXS.NE.0) GO TO 12                                            MODAL     137
C                                                                          MODAL     138
C     PICK OUT DEFLECTIONS AT GIVEN POINTS.                                MODAL     139
C                                                                          MODAL     140
      DO 15 K = 1,NLINES                                                   MODAL     141
      JB = JB + 1                                                          MODAL     142
      NGPI = NGP(K)                                                        MODAL     143
      IF (K.EQ.1) GO TO 16                                                 MODAL     144
      NGPX = NGP(K-1)                                                      MODAL     145
      IF (XGP(1,K).EQ.XGP(NGPX,K-1).AND.YGP(1,K).EQ.YGP(NGPX,K-1))        MODAL     146
     1  JB = JB - 1                                                        MODAL     147
   16 DEF(1,K) = QZ(JB)                                                    MODAL     148
      DO 15 L = 2,NGPI                                                     MODAL     149
      JB = JB + 1                                                          MODAL     150
      DEF(L,K) = QZ(JB)                                                    MODAL     151
   15 CONTINUE                                                             MODAL     152
      GO TO 24                                                             MODAL     153
C                                                                          MODAL     154
C     PICK OUT DEFLECTIONS AT GIVEN POINTS FOR AE CASE.                    MODAL     155
C                                                                          MODAL     156
   12 NZLIN = NLINES / 2                                                   MODAL     157
      DO 17 K = 1,NZLIN                                                    MODAL     158
      JB = JB + 1                                                          MODAL     159
      NGPI = NGP(K)                                                        MODAL     160
      IF (K.EQ.1) GO TO 19                                                 MODAL     161
      NGPX = NGP(K-1)                                                      MODAL     162
      IF (XGP(1,K).EQ.XGP(NGPX,K-1).AND.YGP(1,K).EQ.YGP(NGPX,K-1))        MODAL     163
     1   JB = JB - 2                                                       MODAL     164
   19 DEF(1,K) = QZ(JB)                                                    MODAL     165
      JB = JB + 1                                                          MODAL     166
      DEF(1,K+NZLIN) = DEF(1,K) + QZ(JB) * DIST                            MODAL     167
      DO 17 L = 2,NGPI                                                     MODAL     168
      JB = JB + 1                                                          MODAL     169
      DEF(L,K) = QZ(JB)                                                    MODAL     170
      JB = JB + 1                                                          MODAL     171
```

```
C     READ IN 'LINES' DATA AND DETERMINE X + Y OF GIVEN POINTS: XGP,YGP  MODAL   59
C                                                                         MODAL   60
      B22 = B2*B2                                                         MODAL   61
      READ (ITAPER, 83) NLINES, NELAXS, NICH, NISP                        MODAL   62
      NGPTOT=0                                                            MODAL   63
      DO 1082 I=1,NLINES                                                  MODAL   64
      READ (ITAPER,62) NGP(I),XTERM1(I),YTERM1(I),XTERM2(I),YTERM2(I)    MODAL   65
      NGPTOT=NGPTOT + NGP(I)                                              MODAL   66
      NGPI=NGP(I)                                                         MODAL   67
      DEL=(XTERM2(I)-XTERM1(I))/(YTERM2(I)-YTERM1(I))                     MODAL   68
      YTM1 = YTERM1(I)                                                    MODAL   69
      XTM1 = XTERM1(I)                                                    MODAL   70
      READ (ITAPER,63)(YGP(J,I),J=1,NGPI)                                 MODAL   71
      YTM2 = YTERM2(I)                                                    MODAL   72
      XTM2 = XTERM2(I)                                                    MODAL   73
      DO 1083 JK =1,NGPI                                                  MODAL   74
      XGP(JK,I) = (YGP(JK,I) - YTM1)*DEL + XTM1                           MODAL   75
      XGP1 = YGP(JK,I)                                                    MODAL   76
      IF (XGP1.EQ.YTM2) XGP(JK,I) = XTM2                                  MODAL   77
 1083 CONTINUE                                                            MODAL   78
 1082 CONTINUE                                                            MODAL   79
C                                                                         MODAL   80
C     FORM CREATES A SECOND SET OF POINTS ON A LINE PARALLEL TO THE AE.   MODAL   81
C                                                                         MODAL   82
      KEL=0                                                               MODAL   83
      IF (NELAXS.EQ.1) CALL FORM (NLINES,KEL,NGPTOT,NGPI,XGP,YGP,NGP)     MODAL   84
      NLIN=NLINES-1                                                       MODAL   85
      NGPO=NGPTOT                                                         MODAL   86
C                                                                         MODAL   87
C     COUNT THE INTERSECTION OF TWO GIVEN LINES ONLY ONCE                 MODAL   88
C                                                                         MODAL   89
      DO 77 K=1,NLIN                                                      MODAL   90
      NGPL=NGP(K)                                                         MODAL   91
      IF(XGP(NGPL,K).EQ.XGP(1,K+1).AND.YGP(NGPL,K).EQ.YGP(1,K+1))         MODAL   92
     1 NGPO=NGPO-1                                                        MODAL   93
   77 CONTINUE                                                            MODAL   94
C                                                                         MODAL   95
      IF (NMPT.EQ.0) GO TO 2                                              MODAL   96
      WRITE (ITAPEW,400) NF                                               MODAL   97
      IF ( WILK )   WRITE (ITAPEW,50)                                     MODAL   98
      LINE  =   9 + NGP(1)                                                MODAL   99
      IF ( WILK )         LINE = LINE + 16                                MODAL  100
      WRITE (ITAPEW,70) NGPTOT,NLINES,NMODES                              MODAL  101
    2 CONTINUE                                                            MODAL  102
C                                                                         MODAL  103
C     CALCULATE SLOPES OF GIVEN LINES 'ZEL' AND PRINTOUT GIVEN POINTS.    MODAL  104
C                                                                         MODAL  105
      DO 1 I=1,NLINES                                                     MODAL  106
      IF (NMPT.EQ.0) GO TO 3                                              MODAL  107
      IF ( I .EQ. 1 )     GO TO 13                                        MODAL  108
      LINE  =  LINE + 9 + NGP(I)                                          MODAL  109
      IF ( LINE .LT. 55 )     GO TO 13                                    MODAL  110
      LINE = 9 + NGP(I)                                                   MODAL  111
      WRITE (ITAPEW,400)  NF                                              MODAL  112
   13 WRITE (ITAPEW,51) I,XTERM1(I),YTERM1(I),XTERM2(I),YTERM2(I)         MODAL  113
      WRITE (ITAPEW,52)   NGP(I)                                          MODAL  114
    3 CONTINUE                                                            MODAL  115
```

```
C                                                                         MODAL     2
      SUBROUTINE MODAL (NF,NMODES,ITAPE,WILK,NPOINT,NBOXS,NTBOX)          MODAL     3
C                                                                         MODAL     4
      INTEGER YES                                                         MODAL     5
CIBM                                                                      MODAL     6
C     DIMENSION TITLE(18)                                                 MODAL     7
CIBM                                                                      MODAL     8
CCDC                                                                      MODAL     9
      DIMENSION TITLE(8)                                                  MODAL    10
CCDC                                                                      MODAL    11
      DIMENSION        NGP(20) ,    XTERM1(20) ,    XTERM2(20)            MODAL    12
      DIMENSION     XGP(12,20) ,    YTERM1(20) ,    YTERM2(20)            MODAL    13
      DIMENSION     YGP(12,20) ,        A(400) ,        LL(50)            MODAL    14
      DIMENSION         B(50)  ,       ZEL(20) ,        YY(50)            MODAL    15
      DIMENSION     DEF(12,20) ,       XAT(50) ,    DEFL(50,2)            MODAL    16
      DIMENSION AN(50,2),BQ(400),DH1(400),H(400),XX(400),YU(400),YX(400) MODAL    17
      DIMENSION ITAPES(50)                                                MODAL    18
      DIMENSION QZ(220)                                                   MODAL    19
      DIMENSION WW(40,40), OMG(40)                                        MODAL    20
C                                                                         MODAL    21
      LOGICAL WILK                                                        MODAL    22
C                                                                         MODAL    23
      COMPLEX  C(40,40), DETAD(40,40)                                     MODAL    24
C                                                                         MODAL    25
      COMMON /VARBLS / NCNSM1,NB,NDELT,NDATA,NOPAN,IQ,IR,JSPECS,          MODAL    26
     1                 NCARAY(50),NSARAY(50),NBARAY(50),ACAP,B2,FL,PI,    MODAL    27
     2                 KR,KRDBR,GMA(50),X(400),Y(400),ZZ(400),Z1(400),    MODAL    28
     3                 P1(400),ZZ1(400),Z2(400),P2(400),ZZ2(400),         MODAL    29
     4                 EV(400),PV(400),ZV(400),SDELX(400),DELY(400),      MODAL    30
     5                 XO(50),YO(50),ZO(50),GGMA(50)                      MODAL    31
      COMMON /MODD  / C, DETAD, WW, OMG, NC                               MODAL    32
      COMMON/JUNK/XTERM1,XTERM2,YTERM1,YTERM2,DIST                        MODAL    33
      COMMON /KMP/ NMPT , KLNN                                            MODAL    34
      COMMON /CNTRL/ X1(5), X2(5), Y1(5), Y2(5), XC(050), NCF             MODAL    35
      COMMON /CHSP/ KDEG                                                  MODAL    36
      COMMON /COMRWP/ ITAPER,ITAPEW,ITAPEP                                MODAL    37
      COMMON /COMSTS/ NO    ,YES                                          MODAL    38
      COMMON /CLIST / KOUNT ,KPAGE ,LINES ,LINEST,KLABEL,KTPAGE,NPAGE     MODAL    39
     1               ,KBPAGE,LINESG,KOUNTH,KOUNTI                         MODAL    40
      COMMON /CTABLE/ KTABLE,NPASS ,NROWS ,NCOLS ,NCOLST,KTABLO,NPAGEA    MODAL    41
     1               ,ITAPET                                              MODAL    42
      COMMON / CTAPES / ITAPES                                            MODAL    43
C                                                                         MODAL    44
C                                                                         MODAL    45
C INITIAL CONDITIONS                                                      MODAL    46
C                                                                         MODAL    47
      CALL PROGNA (4H(MOD, 4HAL ))                                        MODAL    48
      NSURF  =  NF                                                        MODAL    49
      KOUNT  =  LINES                                                     MODAL    50
      IF (.NOT. WILK) KSURFT = 1                                          MODAL    51
      IF (      WILK) KSURFT = 2                                          MODAL    52
      ITAP18 =  ITAPES(18)                                                MODAL    53
      MTAP16 =  ITAPES(36)                                                MODAL    54
      REWIND MTAP16                                                       MODAL    55
      MTAP49 =  ITAPES(49)                                                MODAL    56
C                                                                         MODAL    57
C                                                                         MODAL    58
```

```
VARIABLES      SN  TYPE           RELOCATION
 6526  ZZ2          REAL       ARRAY     VARBLS        REFS          7
13432  ZO           REAL       ARRAY     VARBLS        REFS          7
 2606  Z1           REAL       ARRAY     VARBLS        REFS          7
 5066  Z2           REAL       ARRAY     VARBLS        REFS          7
       VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS           TYPE    ARGS        REFERENCES
       HELP                   7              51         54
       MODAL                  7              45         52
       RNRW                   3              69         73

STATEMENT LABELS                DEF LINE    REFERENCES
    0  1                           57          38
    0  2                           74          63
    0  3                           73          64
    0  4                           71          66         70
    0  5                           78          76
  232  700      FMT                84          39

LOOPS  LABEL     INDEX      FROM-TO     LENGTH     PROPERTIES
   26  1         I           38 57        55B                EXT REFS
  104  2         N           63 74        26B                EXT REFS  NOT INNER
  105  3         J           64 73        23B                EXT REFS  NOT INNER
  107  4         I           66 71        13B                EXT REFS
  133  5         I           76 78         7B                EXT REFS

COMMON BLOCKS   LENGTH     MEMBERS - BIAS NAME(LENGTH)
       VARBLS     6014                 0 NCNSM1 (1)              1 NB     (1)              2 NDELT  (1)
                                       3 NDATA  (1)              4 NOPAN  (1)              5 IQ     (1)
                                       6 IR     (1)              7 JSPECS (1)              8 NCARAY (50)
                                      58 NSARAY (50)           108 NBARAY (50)           158 ACAP   (1)
                                     159 B2     (1)            160 FL     (1)            161 PI     (1)
                                     162 KR     (1)            163 KRDBR  (1)            164 GMA    (50)
                                     214 X      (400)          614 Y      (400)         1014 ZZ     (400)
                                    1414 Z1     (400)         1814 P1     (400)         2214 ZZ1    (400)
                                    2614 Z2     (400)         3014 P2     (400)         3414 ZZ2    (400)
                                    3814 EV     (400)         4214 PV     (400)         4614 ZV     (400)
                                    5014 SDELX  (400)         5414 DELY   (400)         5814 XO     (50)
                                    5864 YO     (50)          5914 ZO     (50)          5964 GGMA   (50)
       COMA         41                 0 LC     (40)            40 BR     (1)
       KMP           2                 0 NMPT   (1)              1 KLNN   (1)
       CTAPES       50                 0 ITAPES (50)
       COMRWP        3                 0 ITAPER (1)              1 ITAPEW (1)              2 ITAPEP (1)

STATISTICS
  PROGRAM LENGTH                1147B     615
  CM LABELED COMMON LENGTH     13736B    6110
        52000B CM USED
```

```
VARIABLES      SN  TYPE            RELOCATION
                                                   67        68        77   DEFINED        38        66        76
  242  IBTAPE      INTEGER                       REFS        42        53        67        77   DEFINED        25
    5  IQ          INTEGER                VARBLS REFS         7
    6  IR          INTEGER                VARBLS REFS         7
  244  ISTAPE      INTEGER                       REFS        73   DEFINED        31        32  I/O REFS        33        79
  250  ITAPE       INTEGER                       REFS        45        51        54        69   DEFINED        42        43
                                                   53        67        77  I/O REFS        44        56        78
    2  ITAPEP      INTEGER                COMRWP REFS        16
    0  ITAPER      INTEGER                COMRWP REFS        16  I/O REFS        39
    0  ITAPES      INTEGER       ARRAY    CTAPES REFS         6        15        23        24        25        31
    1  ITAPEW      INTEGER                COMRWP REFS        16
  252  J           INTEGER                       REFS        70   DEFINED        64
  253  JB          INTEGER                       REFS        69        71        72        73   DEFINED        65        71
                                                   72
    7  JSPECS      INTEGER                VARBLS REFS         7
    1  KLNN        INTEGER                KMP    REFS        14   DEFINED        29
  242  KR          INTEGER                VARBLS REFS         7
  243  KRDBR       INTEGER                VARBLS REFS         7
  236  KSURF       LOGICAL                       REFS        18        43        44        49        50        51        52
                                                   54   DEFINED        39
    0  LC          INTEGER       ARRAY    COMA   REFS         5        13        28        29        30
  243  LC3         INTEGER                       REFS        38        66        76   DEFINED        30
  240  MTAP15      INTEGER                       REFS        52   DEFINED        23  I/O REFS        50
  241  MTAP34      INTEGER                       REFS        32        43   DEFINED        24
  251  N        *  INTEGER                    DEFINED        63
    1  NB          INTEGER                VARBLS REFS         7        32
  154  NBARAY      INTEGER       ARRAY    VARBLS REFS         7
  246  NBOXS       INTEGER                       REFS        40        45        51        52        54        55        69
                                                   71   DEFINED        39        68
  254  NBX         INTEGER       ARRAY           REFS        17        68   DEFINED        40
   10  NCARAY      INTEGER       ARRAY    VARBLS REFS         7
    0  NCNSM1      INTEGER                VARBLS REFS         7
  247  NCS         INTEGER                       REFS        51        54   DEFINED        39
    3  NDATA       INTEGER                VARBLS REFS         7
    2  NDELT       INTEGER                VARBLS REFS         7
    0  NM          INTEGER                F.P.   REFS        45        51        52        54        63
                                              DEFINED         4
    0  NMPT        INTEGER                KMP    REFS        14   DEFINED        28
    4  NOPAN       INTEGER                VARBLS REFS         7
    0  NPOINT      INTEGER                F.P.   REFS        45        52   DEFINED         4        27
   72  NSARAY      INTEGER       ARRAY    VARBLS REFS         7
    0  NTBOX       INTEGER                F.P.   REFS        45        51        52        54        55
                                              DEFINED         4        26        55
  241  PI          REAL                   VARBLS REFS         7
10166  PV          REAL          ARRAY    VARBLS REFS         7
 3426  P1          REAL          ARRAY    VARBLS REFS         7
 5706  P2          REAL          ARRAY    VARBLS REFS         7
11626  SDELX       REAL          ARRAY    VARBLS REFS         7
  237  WILK        LOGICAL                       REFS        18        45        52   DEFINED        41        49
  326  X           REAL          ARRAY    VARBLS REFS         7
  312  XI          REAL          ARRAY           REFS        17        69        73
13266  XO          REAL          ARRAY    VARBLS REFS         7
 1146  Y           REAL          ARRAY    VARBLS REFS         7
13350  YO          REAL          ARRAY    VARBLS REFS         7
11006  ZV          REAL          ARRAY    VARBLS REFS         7
 1766  ZZ          REAL          ARRAY    VARBLS REFS         7
```

```
      C                                                                 MIDI      59
      C                                                                 MIDI      60
      C PRINT MODE SHAPES (DEFLECTIONS AND SLOPES) IN DIGITAL FORMAT.  ONE  MIDI  61
      C SURFACE AND ONE MODE PER PAGE.                                  MIDI      62
      C                                                                 MIDI      63
            DO 2 N = 1,NM                                               MIDI      64
            DO 3 J = 1,3                                                MIDI      65
            JB = 1                                                      MIDI      66
            DO 4 I = 1,LC3                                              MIDI      67
            ITAPE  =  IBTAPE + I                                        MIDI      68
            NBOXS = NBX(I)                                              MIDI      69
            CALL RNRW (-ITAPE,XI(JB),NBOXS)                             MIDI      70
            IF  (J.EQ.1)  GOTO 4                                        MIDI      71
          4 JB = JB + NBOXS                                             MIDI      72
            JB = JB - 1                                                 MIDI      73
          3 CALL RNRW (ISTAPE,XI,JB)                                    MIDI      74
          2 CONTINUE                                                    MIDI      75
      C                                                                 MIDI      76
            DO 5 I = 1,LC3                                              MIDI      77
            ITAPE  =  IBTAPE + I                                        MIDI      78
          5 REWIND ITAPE                                                MIDI      79
            REWIND ISTAPE                                               MIDI      80
      C                                                                 MIDI      81
      C                                                                 MIDI      82
      C FORMATS                                                         MIDI      83
      C                                                                 MIDI      84
        700 FORMAT (L5,2I5)                                             MIDI      85
      C                                                                 MIDI      86
            RETURN                                                      MIDI      87
            END                                                         MIDI      88
```

```
CARD NR. SEVERITY  DETAILS    DIAGNOSIS OF PROBLEM

     70     I      4         THIS IF DEGENERATES INTO A SIMPLE TRANSFER TO THE LABEL INDICATED.
```

```
        SYMBOLIC REFERENCE MAP (R=3)

 ENTRY POINTS      DEF LINE      REFERENCES
     3  MIDI            4          86

 VARIABLES      SN  TYPE              RELOCATION
   236  ACAP        REAL                   VARBLS        REFS        7
    50  BR          REAL                   COMA          REFS       13
   237  B2          REAL                   VARBLS        REFS        7
 12446  DELY        REAL          ARRAY    VARBLS        REFS        7
  7346  EV          REAL          ARRAY    VARBLS        REFS        7
   240  FL          REAL                   VARBLS        REFS        7
 13514  GGMA        REAL          ARRAY    VARBLS        REFS        7
   244  GMA         REAL          ARRAY    VARBLS        REFS        7
   245  I           INTEGER                              REFS       40        42        45        51        52        53        54
```

```
      C                                                                   MIDI   2
      C     NMPT    LIST MODAL INPUT DATA                                 MIDI   3
      C     NPOINT  LIST MODAL OUTPUT DATA                                MIDI   4
            SUBROUTINE MIDI (NM,NPOINT,NTBOX)                             MIDI   5
            DIMENSION  LC(40)                                             MIDI   6
            DIMENSION ITAPES(50)                                          MIDI   7
            COMMON /VARBLS / NCNSM1,NB,NDELT,NDATA,NOPAN,IQ,IR,JSPECS,    MIDI   8
           1                 NCARAY(50),NSARAY(50),NBARAY(50),ACAP,B2,FL,PI, MIDI   9
           2                 KR,KRDBR,GMA(50),X(400),Y(400),ZZ(400),Z1(400), MIDI  10
           3                 P1(400),ZZ1(400),Z2(400),P2(400),ZZ2(400),   MIDI  11
           4                 EV(400),PV(400),ZV(400),SDELX(400),DELY(400), MIDI  12
           5                 XO(50),YO(50),ZO(50),GGMA(50)                MIDI  13
            COMMON / COMA  / LC, BR                                       MIDI  14
            COMMON /KMP/ NMPT,KLNN                                        MIDI  15
            COMMON / CTAPES /ITAPES                                       MIDI  16
            COMMON /COMRWP/ ITAPER,ITAPEW,ITAPEP                          MIDI  17
            DIMENSION NBX(30), XI(400)                                    MIDI  18
            LOGICAL KSURF, WILK                                           MIDI  19
      C                                                                   MIDI  20
      C                                                                   MIDI  21
      C INITIAL CONDITIONS                                                MIDI  22
      C                                                                   MIDI  23
            MTAP15 =  ITAPES(35)                                          MIDI  24
            MTAP34 =  ITAPES(34)                                          MIDI  25
            IBTAPE =  ITAPES(40)                                          MIDI  26
            NTBOX  = 0                                                    MIDI  27
            NPOINT = 0                                                    MIDI  28
            NMPT = LC(23)                                                 MIDI  29
            KLNN = LC(24)                                                 MIDI  30
            LC3 = LC(3)                                                   MIDI  31
            ISTAPE =  ITAPES(27)                                          MIDI  32
            IF (NB .NE. 0) ISTAPE = MTAP34                                MIDI  33
            REWIND ISTAPE                                                 MIDI  34
      C                                                                   MIDI  35
      C                                                                   MIDI  36
      C PRIMARY SURFACE LOOP                                              MIDI  37
      C                                                                   MIDI  38
            DO 1 I = 1,LC3                                                MIDI  39
            READ (ITAPER,700) KSURF, NBOXS, NCS                           MIDI  40
            NBX(I) = NBOXS                                                MIDI  41
            WILK = .FALSE.                                                MIDI  42
            ITAPE  =  IBTAPE + I                                          MIDI  43
            IF (KSURF) ITAPE = MTAP34                                     MIDI  44
            IF (KSURF)  REWIND ITAPE                                      MIDI  45
            CALL MODAL (I,NM,ITAPE,WILK,NPOINT,NBOXS,NTBOX)               MIDI  46
      C     **  NPOINT COUNTS THE GIVEN POINTS ON ALL SURF AND CONTROL SURF. MIDI  47
      C     **  NBOXS IS NUMBER OF BOXES ON ENTIRE SURFACE.               MIDI  48
      C     **  NTBOX COUNTS THE BOXES FOR ALL SURFACES.                  MIDI  49
            IF (KSURF) WILK = .TRUE.                                      MIDI  50
            IF (KSURF)  REWIND MTAP15                                     MIDI  51
            IF (KSURF) CALL HELP (I,NM,NCS,NBOXS,NTBOX,ITAPE,1)           MIDI  52
            IF (KSURF) CALL MODAL (I,NM,MTAP15,WILK,NPOINT,NBOXS,NTBOX)   MIDI  53
            ITAPE  =  IBTAPE + I                                          MIDI  54
            IF (KSURF) CALL HELP (I,NM,NCS,NBOXS,NTBOX,ITAPE,2)           MIDI  55
            NTBOX = NTBOX + NBOXS                                         MIDI  56
            REWIND ITAPE                                                  MIDI  57
          1 CONTINUE                                                      MIDI  58
```

```
STATISTICS
  PROGRAM LENGTH              66B      54
         52000B CM USED
```

```
 1          SUBROUTINE ATAN3(Y,X,T)                          ATAN3     2
            PI = 3.141593                                    ATAN3     3
            PI2 = PI*2.0                                     ATAN3     4
            IF(X.EQ.O.) T=PI/2.                              ATAN3     5
 5          IF(X.EQ.O.) GO TO 2                              ATAN3     6
            IF(Y.EQ.O.)T=O.                                  ATAN3     7
            IF(Y.EQ.O.O) GO TO 2                             ATAN3     8
            A = Y/X                                          ATAN3     9
            T = ATAN(A)                                      ATAN3    10
10        2 CONTINUE                                         ATAN3    11
            IF((Y.GE.O.).AND.(X.EQ.O.)) GO TO 1              ATAN3    12
            IF ((Y.EQ.O.).AND.(X.GT.O.)) T=O.                ATAN3    13
            IF ((Y.EQ.O.).AND.(X.GT.O.)) GO TO 1             ATAN3    14
            IF((Y.GE.O.).AND.(X.LE.O.))T = PI + T            ATAN3    15
15          IF((Y.GE.O.).AND.(X.LE.O.))GO TO 1               ATAN3    16
            IF((Y.LE.O.).AND.(X.LE.O.))T = PI + T            ATAN3    17
            IF((Y.LE.O.).AND.(X.LE.O.))GO TO 1               ATAN3    18
            IF((Y.LE.O.).AND.(X.GE.O.))T = PI2+ T            ATAN3    19
            IF((Y.LE.O.).AND.(X.GE.O.))GO TO 1               ATAN3    20
20        1 CONTINUE                                         ATAN3    21
            RETURN                                           ATAN3    22
            END                                              ATAN3    23
```

```
CARD NR. SEVERITY  DETAILS    DIAGNOSIS OF PROBLEM

   19       I         1       THIS IF DEGENERATES INTO A SIMPLE TRANSFER TO THE LABEL INDICATED.
```

```
      SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS      DEF LINE     REFERENCES
   3  ATAN3          1            21

VARIABLES      SN  TYPE          RELOCATION
   65  A            REAL                       REFS     9   DEFINED    8
   63  PI           REAL                       REFS     3      4      14     16   DEFINED     2
   64  PI2          REAL                       REFS    18   DEFINED    3
    0  T            REAL              F.P.     REFS    14     16      18  DEFINED      1      4      6
                                                  9    12     14      16     18
    0  X            REAL              F.P.     REFS     4      5       8     11     12     13     14
                                                 15    16     17      18     19  DEFINED      1
    0  Y            REAL              F.P.     REFS     6      7       8     11     12     13     14
                                                 15    16     17      18     19  DEFINED      1

EXTERNALS          TYPE   ARGS        REFERENCES
       ATAN        REAL     1 LIBRARY     9

STATEMENT LABELS             DEF LINE   REFERENCES
   57  1                        20         11      13      15      17      19
   23  2                        10          5       7
```

```
EQUIV CLASSES    LENGTH     MEMBERS - BIAS NAME(LENGTH)
                                  4800 SDELX  (400)            5200 DELY    (400)

STATISTICS
  PROGRAM LENGTH                7033B     3611
  CM LABELED COMMON LENGTH     20741B     8673
          52000B CM USED
```

```
          62 FORMAT(I5,4E10.2)                                               MODAL     401
          63 FORMAT(8E10.2)                                                  MODAL     402
          70 FORMAT (2X, 19HMODAL DATA GIVEN AT,I4,1X,9HPOINTS ON,I3,1X,     MODAL     403
         1          9HLINES FOR,I3,1X,5HMODES)                               MODAL     404
          82 FORMAT (15X,I4,10X,I4,10X,E18.7)                                MODAL     405
          83 FORMAT(4I5)                                                     MODAL     406
         400 FORMAT(1H1,19X, 15HSURFACE NUMBER ,I3/)                         MODAL     407
         450 FORMAT (15X, 26HINPUT MODAL DATA FOR MODE , I3 //               MODAL     408
         1          15X,4HLINE,10X,5HPOINT,15X,10HDEFLECTION,//)             MODAL     409
        2000 FORMAT (    ,44HINTERPOLATED MODES, PRIMARY SURFACES, SURF =,1I2 MODAL    410
         1          , 9H,  MODE =,1I3,12X)                                   MODAL     411
        2050 FORMAT (     44HINTERPOLATED MODES, CONTROL SURFACES, SURF =,1I2 MODAL    412
         1          , 9H,  MODE =,1I3,12X)                                   MODAL     413
        2100 FORMAT (10X 44HINTERPOLATED MODES, PRIMARY SURFACES, SURF =,1I2 MODAL     414
         1          , 9H,  MODE =,1I3,/,10X,58(1H-))                         MODAL     415
        2150 FORMAT (10X 44HINTERPOLATED MODES, CONTROL SURFACES, SURF =,1I2 MODAL     416
         1          , 9H,  MODE =,1I3,/,10X,58(1H-))                         MODAL     417
        2300 FORMAT (10X, 5H     ,2X,11H          X,2X,11H          Y        MODAL     418
         1                  2X,11H          H,2X,11H      ALPHA              MODAL     419
         2     ,/,10X, 5HPOINT,2X,11H     INCHES,2X,11H     INCHES           MODAL     420
         3                  2X,11H   NO UNITS,2X,11H     RAD/FT)             MODAL     421
        2500 FORMAT (10X,1I5,1P5E13.4)                                       MODAL     422
       CIBM                                                                  MODAL     423
       C3000 FORMAT (18A4)                                                   MODAL     424
       CIBM                                                                  MODAL     425
       CCDC                                                                  MODAL     426
        3000 FORMAT (7A10,1A2)                                               MODAL     427
       CCDC                                                                  MODAL     428
        4000 FORMAT (10X,51                                                  MODAL     429
         1   HINTERPOLATED MODES FOR PRIMARY AND CONTROL SURFACES            MODAL     430
         2     ,/,10X,51(1H-))                                               MODAL     431
         718 FORMAT (4X,I3,3X,E14.7,3X,E14.7)                                MODAL     432
       C                                                                     MODAL     433
             RETURN                                                          MODAL     434
             END                                                             MODAL     435
```

```
      SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS      DEF LINE      REFERENCES
    3  MODAL          2          433

VARIABLES      SN  TYPE           RELOCATION
 2717  A           REAL        ARRAY                REFS        13      250      254      294      325
                                                 DEFINED       249      250
  236  ACAP        REAL                 VARBLS      REFS        25
 4617  AN          REAL        ARRAY                REFS        16      237      249      349      352      354      355
                                                     358       359      361      362  DEFINED      352      358      359
 3621  B           REAL        ARRAY                REFS        14      349  DEFINED      345
 4763  BQ          REAL        ARRAY                REFS        16      384  DEFINED      354
  237  B2          REAL                 VARBLS      REFS        25     2*60      362
 1645  B22         REAL                             REFS       354  DEFINED       60
    0  C           COMPLEX     ARRAY    MODD        REFS        23       31
 4011  DEF         REAL        ARRAY                REFS        15      166      171      190      204
```

```
VARIABLES      SN  TYPE              RELOCATION
                                                    DEFINED      147      150      164      166      169      171
  4453  DEFL       REAL         ARRAY                  REFS       15      237      349      355  DEFINED      204      325
  1655  DEL        REAL                                REFS       74  DEFINED       67
 12446  DFLY       REAL         ARRAY    VARBLS        REFS       25      354
  5200  DETAD      COMPLEX      ARRAY    MODD          REFS       23       31
  5603  DH1        REAL         ARRAY                  REFS       16      379      386  DEFINED      362
   120  DIST       REAL                  JUNK          REFS       32      166      171
  7346  EV         REAL         ARRAY    VARBLS        REFS       25      345
   240  FL         REAL                  VARBLS        REFS       25
 13514  GGMA       REAL         ARRAY    VARBLS        REFS       25
   244  GMA        REAL         ARRAY    VARBLS        REFS       25
  6423  H          REAL         ARRAY                  REFS       16      379      385  DEFINED      361
  1653  I          INTEGER                             REFS     5*64       65       66     4*67       68       69       70
                                                         71       72     2*74       75       76      107      108      110
                                                      5*112      113    5*115      116    2*120    2*203    2*204      304
                                                    DEFINED       63      105      202      303
  1712  II         INTEGER                             REFS    2*230    2*317      335  DEFINED      229      316      334
     5  IQ         INTEGER               VARBLS        REFS       25
     6  IR         INTEGER               VARBLS        REFS       25
     0  ITAPE      INTEGER               F.P.          REFS      384      385      386  DEFINED        2
     2  ITAPEP     INTEGER               COMRWP        REFS       36
     0  ITAPER     INTEGER               COMRWP        REFS       36  I/O REFS       61       64       70
     0  ITAPES     INTEGER      ARRAY    CTAPES        REFS       17       42       52       53       55
     7  ITAPET     INTEGER               CTABLE        REFS       40
     1  ITAPEW     INTEGER               COMRWP        REFS       36      264      266      283      286      375
                                                   I/O REFS       96       97      100      111      112      113      120
                                                        133      134      188      189      190      265      284      285
                                                        374      379
  1642  ITAP18     INTEGER                          DEFINED       52  I/O REFS      276      277      278      279      280
  1704  IU         INTEGER                             REFS      219      223      224      307      311      312
                                                    DEFINED      213      223      301      311
  1660  J          INTEGER                             REFS       70    3*120      182    2*190      322      324      325
                                                        336      338      344      345      346      351    2*352      354
                                                        357    2*358    2*359      361      362  DEFINED       70      117
                                                        181      321      335      350      356
  1674  JB         INTEGER                             REFS      141      145      147      149      150      158      162
                                                        164      165      166      168      169      170      171      173
                                                        174  DEFINED      135      141      145      149      158      162
                                                        165      168      170      173
  1663  JK         INTEGER                             REFS     2*74       75       76  DEFINED       73
     7  JSPECS     INTEGER               VARBLS        REFS       25
  1670  K          INTEGER                             REFS       90     4*91      142      143      144    4*145      147
                                                        150      159      160      161    4*162      164    2*166      169
                                                      2*171    2*190  DEFINED       89      140      157      183
     7  KBPAGE     INTEGER               CLIST         REFS       38
     0  KDEG       INTEGER               CHSP          REFS       35  DEFINED      127      261
  1665  KEL        INTEGER                             REFS       83  DEFINED       82
  1701  KL         INTEGER                             REFS      198      203      204      226      227    3*248
                                                    DEFINED      197
     4  KLABEL     INTEGER               CLIST         REFS       38
     1  KLNN       INTEGER               KMP           REFS       33      262      275      366
     0  KOUNT      INTEGER               CLIST         REFS       38      267      281      287      288      368      369
                                                        372      376      378  DEFINED       49      267      281      287
                                                        372      376      378
    11  KOUNTH     INTEGER               CLIST         REFS       38      369
    12  KOUNTI     INTEGER               CLIST         REFS       38
  1715  KOUNTS     INTEGER                             REFS      368  DEFINED      288      371
```

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VARIABLES      SN   TYPE            RELOCATION
    1  KPAGE       INTEGER              CLIST        REFS        38
  242  KR          INTEGER              VARBLS       REFS        25
  243  KRDBR       INTEGER              VARBLS       REFS        25
 1641  KSURFT      INTEGER                           REFS       277        278        284        285    DEFINED         50         51
    0  KTABLE      INTEGER              CTABLE       REFS        40    DEFINED        270        291
    5  KTABLO      INTEGER              CTABLE       REFS        40
    5  KTPAGE      INTEGER              CLIST        REFS        38
 1676  L           INTEGER                           REFS       150        169      2*171    DEFINED        148        167
 1672  LINE        INTEGER                           REFS        99        108        109        118        185        186        187
                                                  DEFINED        98         99        108        110        118        131        185
                                                      186
    2  LINES       INTEGER              CLIST        REFS        38         49      2*281      2*372
   10  LINESG      INTEGER              CLIST        REFS        38
    3  LINEST      INTEGER              CLIST        REFS        38
 3537  LL          INTEGER     ARRAY                 REFS        13        351        357    DEFINED        346
 1721  LLL         INTEGER                           REFS       353      2*354        360      3*379    DEFINED        351        357
 1713  LM          INTEGER                           REFS       246        249    DEFINED        243
 1714  LPT         INTEGER                           REFS       254        294        321    DEFINED        253
 1722  L1L         INTEGER                           REFS       354        361        362      2*379    DEFINED        353        360
 1673  M           INTEGER                           REFS       134        173        189        245        277        278        284
                                                      285    DEFINED        129        274
 1706  MBOX        INTEGER                           REFS       217        305    DEFINED        216        304
 1705  MM          INTEGER                           REFS       216    DEFINED        215
 1643  MTAP16      INTEGER                           REFS       254        294    DEFINED         53   I/O REFS         54        257
                                                      387
 1644  MTAP49      INTEGER                           REFS       130    DEFINED         55   I/O REFS        128        256
    1  NB          INTEGER              VARBLS       REFS        25
  154  NBARAY      INTEGER     ARRAY    VARBLS       REFS        25
    0  NBOXS       INTEGER              F.P.         REFS       215        303        334        384        385        386
                                                  DEFINED         2
17550  NC          INTEGER              MODD         REFS        31        130
   10  NCARAY      INTEGER     ARRAY    VARBLS       REFS        25
  106  NCF         INTEGER              CNTRL        REFS        34        229        316
    0  NCNSM1      INTEGER              VARBLS       REFS        25
    3  NCOLS       INTEGER              CTABLE       REFS        40    DEFINED        269        290
    4  NCOLST      INTEGER              CTABLE       REFS        40
    3  NDATA       INTEGER              VARBLS       REFS        25
    2  NDELT       INTEGER              VARBLS       REFS        25
 1647  NELAXS      INTEGER                           REFS        83        136    DEFINED         61
    0  NF          INTEGER              F.P.         REFS        48         96        111        133        188
                                                  DEFINED         2
 1720  NFB         INTEGER                           REFS       339        344        345        346        348        349        350
                                                      355        356    DEFINED        333        339
 1702  NFP         INTEGER                           REFS       233        234        236        237        243
                                                  DEFINED       206        233
 1733  NGP         INTEGER     ARRAY                 REFS        11         65         66         83         90         98        108
                                                      110        113        116        142        144        159        161        182
                                                      198    DEFINED         64
 1654  NGPI        INTEGER                           REFS        70         73         83        117        148        167        183
                                                      202        205        237    DEFINED         66        116        142        159
                                                      182        198        327
 1671  NGPL        INTEGER                           REFS      2*91        237    DEFINED         90        205
 1667  NGPO        INTEGER                           REFS        91        173    DEFINED         85         91
 1652  NGPTOT      INTEGER                           REFS        65         83         85        100    DEFINED         62         65
 1675  NGPX        INTEGER                           REFS     2*145      2*162    DEFINED        144        161
 1650  NICH        INTEGER                           REFS       261    DEFINED         61
```

```
VARIABLES     SN  TYPE            RELOCATION
  1666  NLIN      INTEGER                        REFS      89   DEFINED      84
  1646  NLINES    INTEGER                        REFS      63        83      84     100     105     140     156
                                                  181     197   DEFINED      61
     0  NMODES    INTEGER               F.P.     REFS     100       129     173     274  DEFINED       2
     0  NMPT      INTEGER              KMP       REFS      33        95     106     119     132     175
     0  NO        INTEGER              COMSTS    REFS      37
     4  NOPAN     INTEGER              VARBLS    REFS      25
     6  NPAGE     INTEGER              CLIST     REFS      38
     6  NPAGEA    INTEGER              CTABLE    REFS      40
     1  NPASS     INTEGER              CTABLE    REFS      40
  1717  NPL       INTEGER                        REFS     349       355  DEFINED     328
     0  NPOINT    INTEGER               F.P.     REFS     135   DEFINED       2     174
  1700  NPT       INTEGER                        REFS     244       246     247     248     249   2*250     253
                                                  323     324       325     327     328     349     355
                                              DEFINED     193       244     320     323
     2  NROWS     INTEGER              CTABLE    REFS      40   DEFINED     268     289
    72  NSARAY    INTEGER     ARRAY    VARBLS    REFS      25
  1716  NSB       INTEGER                        REFS     313       338  DEFINED     299     313
  1640  NSURF     INTEGER                        REFS     277       278     284     285  DEFINED      48
     0  NTBOX     INTEGER               F.P.     REFS     216       304     335     353     360
                                              DEFINED       2
  1710  NU        INTEGER                        REFS     220       308  DEFINED     219     307
  1677  NZLIN     INTEGER                        REFS     157       166     171  DEFINED     156
 17500  OMG       REAL        ARRAY    MODD      REFS      19        31
   241  PI        REAL                 VARBLS    REFS      25
 10166  PV        REAL        ARRAY    VARBLS    REFS      25
  3426  P1        REAL        ARRAY    VARBLS    REFS      25
  5706  P2        REAL        ARRAY    VARBLS    REFS      25
 11523  QZ        REAL        ARRAY              REFS      18       130     147     150     164     166     169
                                                  171
  1703  R         REAL                           REFS     218       226     227     248     306   2*317     322
                                                  336 DEFINED       212     225     235     247     300     314
  1711  RU        REAL                           REFS     221       309  DEFINED     220     308
 11626  SDELX     REAL        ARRAY    VARBLS    REFS      25       354
  1723  TITLE     REAL        ARRAY              REFS       9       292  DEFINED     280
     0  WILK      LOGICAL               F.P.     REFS      21        50      51      97      99     228     315
                                                  337 DEFINED         2
 14400  WW        REAL        ARRAY    MODD      REFS      19        31
   326  X         REAL        ARRAY    VARBLS    REFS      25       338     344     379
  4371  XAT       REAL        ARRAY              REFS      15       237     349     355  DEFINED     203     324
    24  XC        REAL        ARRAY    CNTRL     REFS      34       338
  1757  XGP       REAL        ARRAY              REFS      12        83    2*91     120   2*145   2*162
                                              DEFINED      74        76
  1664  XGP1      REAL                           REFS      76   DEFINED      75
     0  XTERM1    REAL        ARRAY    JUNK      REFS      11        32      67      69     112     115     248
                                              DEFINED      64
    24  XTERM2    REAL        ARRAY    JUNK      REFS      11        32      67      72     112     115
                                              DEFINED      64
  1657  XTM1      REAL                           REFS      74   DEFINED      69
  1662  XTM2      REAL                           REFS      76   DEFINED      72
  7243  XX        REAL        ARRAY              REFS      16       324  DEFINED     248
 13266  XO        REAL        ARRAY    VARBLS    REFS      25
     0  X1        REAL        ARRAY    CNTRL     REFS      34
     5  X2        REAL        ARRAY    CNTRL     REFS      34
  1146  Y         REAL        ARRAY    VARBLS    REFS      25       217     305     336     379
     1  YES       INTEGER              COMSTS    REFS       4        37
  2337  YGP       REAL        ARRAY              REFS      13        74      75      83    2*91     120   2*145
```

```
VARIABLES      SN  TYPE           RELOCATION
                                                  2*162     203    DEFINED      70
  1707  YS         REAL                            REFS     218       221      224       225     2*230       234       235
                                                    306     309       312      314   DEFINED       217       305
    50  YTERM1     REAL        ARRAY    JUNK       REFS      12        32       67        68       112       115       226
                                                    248  DEFINED       64
    74  YTERM2     REAL        ARRAY    JUNK       REFS      12        32       67        71       112       115       227
                                                DEFINED      64
  1656  YTM1       REAL                            REFS      74   DEFINED       68
  1661  YTM2       REAL                            REFS      76   DEFINED       71
 10[illegible]  [illegible]   REAL        ARRAY              REFS      16       220      308   DEFINED       214       224       302
                                                    312
 10703  YX         REAL        ARRAY               REFS      16       247      322   DEFINED       246
  3727  YY         REAL        ARRAY               REFS      14       237      246       355   DEFINED       234       344
 13350  YO         REAL        ARRAY    VARBLS     REFS      25
    12  Y1         REAL        ARRAY    CNTRL      REFS      34       230      317
    17  Y2         REAL        ARRAY    CNTRL      REFS      34       230      317
  3703  ZEL        REAL        ARRAY               REFS      14       248  DEFINED       115
 11006  ZV         REAL        ARRAY    VARBLS     REFS      25
  1766  ZZ         REAL        ARRAY    VARBLS     REFS      25
  4246  ZZ1        REAL        ARRAY    VARBLS     REFS      25
  6526  ZZ2        REAL        ARRAY    VARBLS     REFS      25
 13432  ZO         REAL        ARRAY    VARBLS     REFS      25
  2606  Z1         REAL        ARRAY    VARBLS     REFS      25
  5066  Z2         REAL        ARRAY    VARBLS     REFS      25
        VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS          TYPE   ARGS       REFERENCES
        FORM                 7            83
        HELGA               11           237       349      355
        PLB                  3           264       266      283       286      375
        PROGNA               2            47
        PTABLE               3           271       292
        RNRW                 3           130       254      294       384      385       386
        TITLES               1           263       282      367       373

INLINE FUNCTIONS   TYPE   ARGS        DEF LINE  REFERENCES
        ABS        REAL      1  INTRIN              250      352       358      359
        MINO       INTEGER   0  INTRIN              205      328

STATEMENT LABELS              DEF LINE   REFERENCES
     0  1                        123        105
   152  2                        101         95
   201  3                        114        106
   715  5                        326        321       322
     0  6                        251        243
   527  7                        249        245
   744  8                        347        334       336      338
     0  9                        381        356
     0  10                       122        117
     0  11          INACTIVE     294
   306  12                       156        136
   164  13                       112        107       109
     0  15                       151        140       148
   265  16                       147        143
     0  17                       172        157       167
   222  18                       121        119
   326  19                       164        160
```

STATEMENT	LABELS		DEF LINE	REFERENCES				
416	20		193	175				
0	22		204	202				
357	24		173	152				
0	30		231	229				
476	31		233	228	230			
0	32		318	316				
740	35		339	337				
703	36		320	315	317			
1426	50	FMT	393	97				
1432	51	FMT	394	112				
1445	52	FMT	397	113				
403	60		190	181	183	187		
1460	62	FMT	400	64				
1463	63	FMT	401	70				
1465	70	FMT	402	100				
0	77		93	89				
1475	82	FMT	404	190				
1501	83	FMT	405	61				
0	99		354	350				
643	100		293	275				
1053	120		382	303	306	309	319	348
573	123		273	262				
0	150		255	129				
1021	200		370	368				
1035	250		377	369				
0	300		222	219				
0	301		310	307				
1050	310		380	366				
1503	400	FMT	406	96	111	133	188	
1507	450	FMT	407	134	189			
0	570		386	274				
1624	718	FMT	431	120				
244	862		135	132				
536	875		252	197	236			
501	876		235	215	218	221	226	227 232
0	1082		78	63				
0	1083		77	73				
1520	2000	FMT	409	277				
1531	2050	FMT	411	278				
1542	2100	FMT	413	284				
1554	2150	FMT	415	285				
1566	2300	FMT	417	374				
1607	2500	FMT	421	379				
1612	3000	FMT	426	280				
1614	4000	FMT	428	265				

LOOPS	LABEL	INDEX	FROM-TO	LENGTH	PROPERTIES		
32	1082	I	63 78	56B		EXT REFS	NOT INNER
74	1083	JK	73 77	10B	OPT		
124	77	K	89 93	12B	OPT		
153	1	I	105 123	54B		EXT REFS	NOT INNER
210	10	J	117 122	15B		EXT REFS	
233	150	M	129 255	314B		EXT REFS	NOT INNER
250	15	K	140 151	36B		NOT INNER	
277	15	L	148 151	3B	INSTACK		
311	17	K	157 172	46B		NOT INNER	
346	17	I	167 172	6B	INSTACK		

```
LOOPS  LABEL   INDEX    FROM-TO    LENGTH   PROPERTIES
  367  60      J        181 190      27B              EXT REFS  NOT INNER
  372  60      K        183 190      22B              EXT REFS
  420  875     KL       197 252     121B              EXT REFS  NOT INNER
  427  22      I        202 204       4B    INSTACK
  442  876     MM       215 235      43B              NOT INNER
  450  300     NU       219 222       6B    INSTACK     EXITS
  467  30      II       229 231       7B    INSTACK     EXITS
  520  6       LM       243 251      14B      OPT
  574  570     M        274 386     300B              EXT REFS  NOT INNER
  652  120     I        303 382     204B              EXT REFS  NOT INNER
  660  301     NU       307 310       6B    INSTACK     EXITS
  674  32      II       316 318       7B    INSTACK     EXITS
  710  5       J        321 326       6B    INSTACK
  732  8       II       334 347      13B      OPT
  755  99      J        350 354      13B      OPT
  774  9       J        356 381      57B              EXT REFS

COMMON BLOCKS    LENGTH     MEMBERS - BIAS NAME(LENGTH)
       VARBLS     6014             0 NCNSM1 (1)            1 NB     (1)            2 NDELT  (1)
                                   3 NDATA  (1)            4 NOPAN  (1)            5 IQ     (1)
                                   6 IR     (1)            7 JSPECS (1)            8 NCARAY (50)
                                  58 NSARAY (50)         108 NBARAY (50)         158 ACAP   (1)
                                 159 B2     (1)          160 FL     (1)          161 PI     (1)
                                 162 KR     (1)          163 KRDBR  (1)          164 GMA    (50)
                                 214 X      (400)        614 Y      (400)       1014 ZZ     (400)
                                1414 Z1     (400)       1814 P1     (400)       2214 ZZ1    (400)
                                2614 Z2     (400)       3014 P2     (400)       3414 ZZ2    (400)
                                3814 EV     (400)       4214 PV     (400)       4614 ZV     (400)
                                5014 SDELX  (400)       5414 DELY   (400)       5814 XO     (50)
                                5864 YO     (50)        5914 ZO     (50)        5964 GGMA   (50)
       MODD       8041             0 C      (3200)      3200 DETAD  (3200)      6400 WW     (1600)
                                8000 OMG    (40)        8040 NC     (1)
       JUNK         81             0 XTERM1 (20)          20 XTERM2 (20)          40 YTERM1 (20)
                                  60 YTERM2 (20)          80 DIST   (1)
       KMP           2             0 NMPT   (1)            1 KLNN   (1)
       CNTRL        71             0 X1     (5)            5 X2     (5)           10 Y1     (5)
                                  15 Y2     (5)           20 XC     (50)          70 NCF    (1)
       CHSP          1             0 KDEG   (1)
       COMRWP        3             0 ITAPER (1)            1 ITAPEW (1)            2 ITAPEP (1)
       COMSTS        2             0 NO     (1)            1 YES    (1)
       CLIST        11             0 KOUNT  (1)            1 KPAGE  (1)            2 LINES  (1)
                                   3 LINEST (1)            4 KLABEL (1)            5 KTPAGE (1)
                                   6 NPAGE  (1)            7 KBPAGE (1)            8 LINESG (1)
                                   9 KOUNTH (1)           10 KOUNTI (1)
       CTABLE        8             0 KTABLE (1)            1 NPASS  (1)            2 NROWS  (1)
                                   3 NCOLS  (1)            4 NCOLST (1)            5 KTABLO (1)
                                   6 NPAGEA (1)            7 ITAPET (1)
       CTAPES       50             0 ITAPES (50)

STATISTICS
  PROGRAM LENGTH                 12121B     5201
  CM LABELED COMMON LENGTH       33714B    14284
         52000B CM USED
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```
      SUBROUTINE HELP (NF,NM,NCS,NBOXS,NTOT,ITAPE,KHELP)                HELP   2
C                                                                       HELP   3
      DIMENSION       XC(050) ,        X1(5) ,        X2(5)             HELP   4
      DIMENSION Y1(5)                ,Y2(5)                             HELP   5
      DIMENSION XA(400), XI(400)                                        HELP   6
      DIMENSION ITAPES(50)                                              HELP   7
C                                                                       HELP   8
      COMMON /VARBLS / NCNSM1,NB,NDELT,NDATA,NOPAN,IQ,IR,JSPECS,        HELP   9
     1                 NCARAY(50),NSARAY(50),NBARAY(50),ACAP,B2,FL,PI,  HELP  10
     2                KR,KRDBR,GMA(50),X(400),Y(400),ZZ(400),Z1(400),   HELP  11
     3                 P1(400),ZZ1(400),Z2(400),P2(400),ZZ2(400),       HELP  12
     4                 EV(400),PV(400),ZV(400),SDELX(400),DELY(400),    HELP  13
     5                 XO(50),YO(50),ZO(50),GGMA(50)                    HELP  14
      COMMON /KMP/ NMPT , KLNN                                          HELP  15
      COMMON /CNTRL/ X1 , X2 , Y1 , Y2 , XC , NCF                       HELP  16
      COMMON / CTAPES / ITAPES                                          HELP  17
C                                                                       HELP  18
C                                                                       HELP  19
      ITAPER = ITAPES(5)                                                HELP  20
      ITAPEW = ITAPES(6)                                                HELP  21
      MTAP14 =  ITAPES(34)                                              HELP  22
      MTAP15 =  ITAPES(35)                                              HELP  23
C                                                                       HELP  24
C                                                                       HELP  25
C                                                                       HELP  26
C                                                                       HELP  27
C                                                                       HELP  28
      GO TO (10, 45) , KHELP                                            HELP  29
   10 NCF  =  NCS                                                       HELP  30
      IF (NMPT.NE.0) WRITE (ITAPEW,1)                                   HELP  31
      DO 20 II=1,NCS                                                    HELP  32
      READ (ITAPER,30) X1(II) , Y1(II) , X2(II) , Y2(II)                HELP  33
      IF (NMPT.EQ.0) GO TO 3                                            HELP  34
      WRITE (ITAPEW,2) II , X1(II) , Y1(II) , X2(II) , Y2(II)           HELP  35
    3 CONTINUE                                                          HELP  36
   20 CONTINUE                                                          HELP  37
      NSB      = 0                                                      HELP  38
      YS       = 0.0                                                    HELP  39
      DO 40 J = 1,NBOXS                                                 HELP  40
      MBOX     = NTOT + J                                               HELP  41
      IF(YS.EQ.Y(MBOX))      GO TO 40                                   HELP  42
      YS       = Y(MBOX)                                                HELP  43
      NSB      = NSB + 1                                                HELP  44
      DO 25 I =1,NCS                                                    HELP  45
      IF (YS.LE.Y1(I))       GO TO 25                                   HELP  46
      IF (YS.GE.Y2(I))       GO TO 25                                   HELP  47
      XC(NSB) = X1(I) + (X2(I) - X1(I))* (YS - Y1(I)) / (Y2(I) - Y1(I)) HELP  48
      GO TO 40                                                          HELP  49
   25 XC(NSB) = 1.0E+06                                                 HELP  50
   40 CONTINUE                                                          HELP  51
      GO TO 100                                                         HELP  52
   45 CONTINUE                                                          HELP  53
C                                                                       HELP  54
      REWIND MTAP14                                                     HELP  55
      REWIND MTAP15                                                     HELP  56
C                                                                       HELP  57
      DO 60 I = 1,NM                                                    HELP  58
```

```
      IF (KLNN.EQ.O) GO TO 4
      WRITE (ITAPEW,70) NF
      WRITE (ITAPEW,71) I
    4 CONTINUE
      DO 5 J = 1,3
      CALL RNRW (-MTAP15,XA,NBOXS)
      CALL RNRW (-MTAP14,XI,NBOXS)
      R = 0.0
      NSB = 0
      DO 50 JJ = 1,NBOXS
      MBOX = NTOT + JJ
      XW  = X(MBOX)
      YW  = Y(MBOX)
      IF (YW.EQ.R)                     GO TO 28
      NSB = NSB + 1
      R = YW
      DO 27 II = 1,NCS
      IF (YW.GE.Y1(II).AND.YW.LE.Y2(II)) GO TO 28
   27 CONTINUE
      GO TO 50
   28 IF (XW.LT.XC(NSB)        )       GO TO 50
      XI(JJ) = XA(JJ)
   50 CONTINUE
C
      CALL RNRW (ITAPE,XI,NBOXS)
      IF (KLNN.EQ.O) GO TO 5
      IF (J .EQ. 1) WRITE (ITAPEW,81)
      IF (J .EQ. 2) WRITE (ITAPEW,82)
      IF (J .EQ. 3) WRITE (ITAPEW,83)
      WRITE (ITAPEW,73) (K,XI(K),K=1,NBOXS)
    5 CONTINUE
   60 CONTINUE
      REWIND MTAP14
      REWIND MTAP15
  100 CONTINUE
C
C
C FORMATS
C
    1 FORMAT (/20X,35HCOORDINATES OF HINGE LINE IN INCHES//13X,
     1         7HSURFACE,26X,7HINBOARD,27X,8HOUTBOARD, //14X,5HINDEX,
     2         22X,1HX,14X,1HY,19X,1HX,14X,1HY,//)
    2 FORMAT ((15X,I3,2(10X,E10.2,5X,E10.2))/)
   30 FORMAT(4E10.2)
   70 FORMAT (1H1, 20X, 15HSURFACE NUMBER ,I3, //3X, 67HINTERPOLATED MOD
     1AL DATA FOR SURFACE AND CONTROL SURFACE COMBINATION,//)
   71 FORMAT (20X, 8HMODE NO , I3//)
   73 FORMAT (6(4X,I4,2X,E10.3))
   81 FORMAT (10X,60HBOX NUMBER FOLLOWED BY H(1/4 CHORD) * ELEMENT AREA
     1(SQ. FT.))
   82 FORMAT (10X,35HBOX NUMBER FOLLOWED BY H(3/4 CHORD))
   83 FORMAT (10X,39HBOX NUMBER FOLLOWED BY ALPHA(3/4 CHORD))
C
      RETURN
      END
```

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CARD NR. SEVERITY  DETAILS     DIAGNOSIS OF PROBLEM

     28      I                AN IF STATEMENT MAY BE MORE EFFICIENT THAN A 2 OR 3 BRANCH COMPUTED GO TO STATEMENT.



        SYMBOLIC REFERENCE MAP (R=3)

 ENTRY POINTS      DEF LINE      REFERENCES
     3  HELP            1         111

 VARIABLES      SN  TYPE             RELOCATION
   236  ACAP        REAL                 VARBLS       REFS       8
   237  B2          REAL                 VARBLS       REFS       8
 12446  DELY        REAL         ARRAY   VARBLS       REFS       8
  7346  EV          REAL         ARRAY   VARBLS       REFS       8
   240  FL          REAL                 VARBLS       REFS       8
 13514  GGMA        REAL         ARRAY   VARBLS       REFS       8
   244  GMA         REAL         ARRAY   VARBLS       REFS       8
   430  I           INTEGER                           REFS      45        46      6*47        60   DEFINED        44        57
   423  II          INTEGER                           REFS    4*32      5*34      2*75   DEFINED        31        74
     5  IQ          INTEGER              VARBLS       REFS       8
     6  IR          INTEGER              VARBLS       REFS       8
     0  ITAPE       INTEGER               F.P.        REFS      82   DEFINED         1
   417  ITAPER      INTEGER                        DEFINED      19  I/O REFS        32
     0  ITAPES      INTEGER      ARRAY   CTAPES       REFS       6        16        19        20        21        22
   420  ITAPEW      INTEGER                        DEFINED      20  I/O REFS        30        34        59        60        84
                                                        85      86        87
   426  J           INTEGER                           REFS      40        84        85        86   DEFINED        39        62
   432  JJ          INTEGER                           REFS      68      2*79   DEFINED        67
     7  JSPECS      INTEGER              VARBLS       REFS       8
   435  K           INTEGER                           REFS    2*87   DEFINED        87
     0  KHELP       INTEGER               F.P.        REFS      28   DEFINED         1
     1  KLNN        INTEGER              KMP          REFS      14        58        83
   242  KR          INTEGER              VARBLS       REFS       8
   243  KRDBR       INTEGER              VARBLS       REFS       8
   427  MBOX        INTEGER                           REFS      41        42        69        70   DEFINED        40        68
   421  MTAP14      INTEGER                           REFS      64   DEFINED        21  I/O REFS        54        90
   422  MTAP15      INTEGER                           REFS      63   DEFINED        22  I/O REFS        55        91
     1  NB          INTEGER              VARBLS       REFS       8
   154  NBARAY      INTEGER      ARRAY   VARBLS       REFS       8
     0  NBOXS       INTEGER               F.P.        REFS      39        63        64        67        82        87
                                                   DEFINED       1
    10  NCARAY      INTEGER      ARRAY   VARBLS       REFS       8
   106  NCF         INTEGER              CNTRL        REFS      15   DEFINED        29
     0  NCNSM1      INTEGER              VARBLS       REFS       8
     0  NCS         INTEGER               F.P.        REFS      29        31        44        74   DEFINED         1
     3  NDATA       INTEGER              VARBLS       REFS       8
     2  NDELT       INTEGER              VARBLS       REFS       8
     0  NF          INTEGER               F.P.        REFS      59   DEFINED         1
     0  NM          INTEGER               F.P.        REFS      57   DEFINED         1
     0  NMPT        INTEGER              KMP          REFS      14        30        33
     4  NOPAN       INTEGER              VARBLS       REFS       8
    72  NSARAY      INTEGER      ARRAY   VARBLS       REFS       8
   424  NSB         INTEGER                           REFS      43        47        49        72        78
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VARIABLES     SN  TYPE           RELOCATION
                                               DEFINED     37        43       66        72
     0  NTOT       INTEGER            F.P.       REFS      40        68    DEFINED       1
   241  PI         REAL               VARBLS     REFS       8
 10166  PV         REAL      ARRAY    VARBLS     REFS       8
  3426  P1         REAL      ARRAY    VARBLS     REFS       8
  5706  P2         REAL      ARRAY    VARBLS     REFS       8
   431  R          REAL                          REFS      71   DEFINED       65        73
 11626  SDELX      REAL      ARRAY    VARBLS     REFS       8
   326  X          REAL      ARRAY    VARBLS     REFS       8        69
   436  XA         REAL      ARRAY               REFS       5        63       79
    24  XC         REAL      ARRAY    CNTRL      REFS       3        15       78   DEFINED        47        49
  1256  XI         REAL      ARRAY               REFS       5        64       82        87   DEFINED        79
   433  XW         REAL                          REFS      78   DEFINED       69
 13266  XO         REAL      ARRAY    VARBLS     REFS       8
     0  X1         REAL      ARRAY    CNTRL      REFS       3        15       34      2*47   DEFINED        32
     5  X2         REAL      ARRAY    CNTRL      REFS       3        15       34        47   DEFINED        32
  1146  Y          REAL      ARRAY    VARBLS     REFS       8        41       42        70
   425  YS         REAL                          REFS      41        45       46        47   DEFINED        38        42
   434  YW         REAL                          REFS      71        73     2*75   DEFINED        70
 13350  YO         REAL      ARRAY    VARBLS     REFS       8
    12  Y1         REAL      ARRAY    CNTRL      REFS       4        15       34        45      2*47        75
                                               DEFINED     32
    17  Y2         REAL      ARRAY    CNTRL      REFS       4        15       34        46        47        75
                                               DEFINED     32
 11006  ZV         REAL      ARRAY    VARBLS     REFS       8
  1766  ZZ         REAL      ARRAY    VARBLS     REFS       8
  4246  ZZ1        REAL      ARRAY    VARBLS     REFS       8
  6526  ZZ2        REAL      ARRAY    VARBLS     REFS       8
 13432  ZO         REAL      ARRAY    VARBLS     REFS       8
  2606  Z1         REAL      ARRAY    VARBLS     REFS       8
  5066  Z2         REAL      ARRAY    VARBLS     REFS       8
        VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS          TYPE   ARGS       REFERENCES
        RNRW                3             63        64        82

STATEMENT LABELS            DEF LINE   REFERENCES
   324  1        FMT           97         30
   342  2        FMT          100         34
    50  3                      35         33
   117  4                      61         58
   216  5                      88         62        83
    22  10                     29         28
     0  20                     36         31
    75  25                     49         44        45        46
     0  27                     76         74
   153  28                     78         71        75
   346  30       FMT          101         32
   102  40                     50         39        41        48
   105  45                     52         28
   160  50                     80         67        77        78
     0  60                     89         57
   350  70       FMT          102         59
   364  71       FMT          104         60
   367  73       FMT          105         87
   372  81       FMT          106         84
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STATEMENT LABELS              DEF LINE   REFERENCES
  410  83      FMT                109        86
  227  100                         92        51

LOOPS  LABEL     INDEX     FROM-TO    LENGTH    PROPERTIES
   27  20        II          31 36       24B               EXT REFS
   55  40        J           39 50       30B               NOT INNER
   64  25        I           44 49       16B        OPT      EXITS
  112  60        I           57 89      111B               EXT REFS  NOT INNER
  120  5         J           62 88      101B               EXT REFS  NOT INNER
  133  50        JJ          67 80       30B               NOT INNER
  144  27        II          74 76        7B     INSTACK     EXITS
  206            K           87 87        7B               EXT REFS

COMMON BLOCKS   LENGTH    MEMBERS - BIAS NAME(LENGTH)
       VARBLS     6014              0 NCNSM1 (1)             1 NB     (1)             2 NDELT  (1)
                                    3 NDATA  (1)             4 NOPAN  (1)             5 IQ     (1)
                                    6 IR     (1)             7 JSPECS (1)             8 NCARAY (50)
                                   58 NSARAY (50)          108 NBARAY (50)          158 ACAP   (1)
                                  159 B2     (1)           160 FL     (1)           161 PI     (1)
                                  162 KR     (1)           163 KRDBR  (1)           164 GMA    (50)
                                  214 X      (400)         614 Y      (400)        1014 ZZ     (400)
                                 1414 Z1     (400)        1814 P1     (400)        2214 ZZ1    (400)
                                 2614 Z2     (400)        3014 P2     (400)        3414 ZZ2    (400)
                                 3814 EV     (400)        4214 PV     (400)        4614 ZV     (400)
                                 5014 SDELX  (400)        5414 DELY   (400)        5814 XO     (50)
                                 5864 YO     (50)         5914 ZO     (50)         5964 GGMA   (50)
       KMP           2              0 NMPT   (1)             1 KLNN   (1)
       CNTRL        71              0 X1     (5)             5 X2     (5)            10 Y1     (5)
                                   15 Y2     (5)            20 XC     (50)           70 NCF    (1)
       CTAPES       50              0 ITAPES (50)

STATISTICS
  PROGRAM LENGTH                  2114B      1100
  CM LABELED COMMON LENGTH       13771B      6137
        52000B CM USED
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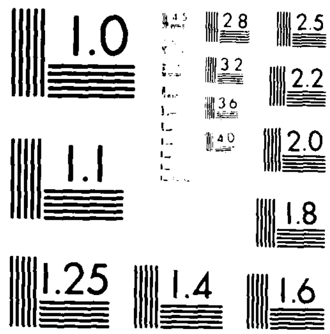
```
      SUBROUTINE BIDI (NM,NPOINT,NTBOX)                                 BIDI       2
      COMMON /VARBLS / NCNSM1,NB,NDELT,NDATA,NOPAN,IQ,IR,JSPECS,        BIDI       3
     1                 NCARAY(50),NSARAY(50),NBARAY(50),ACAP,B2,FL,PI,  BIDI       4
     2                 KR,KRDBR,GMA(50),X(400),Y(400),ZZ(400),Z1(400),  BIDI       5
     3                 P1(400),ZZ1(400),Z2(400),P2(400),ZZ2(400),       BIDI       6
     4                 EV(400),PV(400),ZV(400),SDELX(400),DELY(400),    BIDI       7
     5                 XO(50),YO(50),ZO(50),GGMA(50)                    BIDI       8
      COMMON/BODY/ RO(100), ROP(100), NBEA(20), BGMA(20), MRK(20,2),    BIDI       9
     1             XBO(20), YBO(20), ZBO(20)                            BIDI      10
      COMMON / CTAPES / ITAPES                                          BIDI      11
      DIMENSION XI(400)                                                 BIDI      12
      DIMENSION ITAPES(50)                                              BIDI      13
C                                                                       BIDI      14
C                                                                       BIDI      15
C                                                                       BIDI      16
C INITIAL CONDITIONS                                                    BIDI      17
C                                                                       BIDI      18
      MTAP15 =  ITAPES(35)                                              BIDI      19
      IBTAPE =  ITAPES(40)                                              BIDI      20
      NTEL   =  NCNSM1                                                  BIDI      21
      MMRK = MRK(1,1)                                                   BIDI      22
      DO 1 I = 1,NB                                                     BIDI      23
      NEL = NBEA(I)                                                     BIDI      24
      IF (I.GT.1) NEL = NEL - NBEA(I-1)                                 BIDI      25
      NIB = MRK(I,2) - MRK(I,1) + 1                                     BIDI      26
      ITAPE  =  IBTAPE + I                                              BIDI      27
      REWIND ITAPE                                                      BIDI      28
      CALL BEIN (I,NM,ITAPE,NPOINT,NIB,NEL,NTEL)                        BIDI      29
      REWIND ITAPE                                                      BIDI      30
      MK = MRK(I,1)                                                     BIDI      31
      IF (MK.LT.MMRK) MMRK = MK                                         BIDI      32
    1 NTEL = NTEL + NEL                                                 BIDI      33
      DO 2 N = 1,NM                                                     BIDI      34
      DO 3 J = 1,4                                                      BIDI      35
      JB = 1                                                            BIDI      36
      DO 4 I = 1,NB                                                     BIDI      37
      ITAPE  =  IBTAPE + I                                              BIDI      38
      NEL = NBEA(I)                                                     BIDI      39
      IF (I.GT.1) NEL = NEL - NBEA(I-1)                                 BIDI      40
      CALL RNRW (-ITAPE,XI(JB),NEL)                                     BIDI      41
    4 JB = JB + NEL                                                     BIDI      42
      JB = JB - 1                                                       BIDI      43
    3 CALL RNRW (IBTAPE,XI,JB)                                          BIDI      44
      DO 5 J = 1,3                                                      BIDI      45
      DO 7 I = 1,400                                                    BIDI      46
    7 XI(I) = 0.0                                                       BIDI      47
      DO 6 I = 1,NB                                                     BIDI      48
      JP = MRK(I,1)                                                     BIDI      49
      NIB = MRK(I,2) - MRK(I,1) + 1                                     BIDI      50
      ITAPE  =  IBTAPE + I                                              BIDI      51
      CALL RNRW (-ITAPE, XI(JP), NIB)                                   BIDI      52
    6 CONTINUE                                                          BIDI      53
      JP = NCNSM1 - NTBOX                                               BIDI      54
      J1 = MMRK                                                         BIDI      55
    5 CALL RNRW (MTAP15, XI(J1), JP)                                    BIDI      56
      IF (N.NE.NM)  GOTO 2                                              BIDI      57
      DO 8  I=1,NB                                                      BIDI      58
```

```
                      ITAPE  =  IBTAPE + I                                                BIDI       59
                    8 REWIND ITAPE                                                        BIDI       60
      60            2 CONTINUE                                                            BIDI       61
                      REWIND MTAP15                                                       BIDI       62
                      REWIND IBTAPE                                                       BIDI       63
                      RETURN                                                              BIDI       64
                      END                                                                 BIDI       65


          SYMBOLIC REFERENCE MAP (R=3)

      ENTRY POINTS      DEF LINE      REFERENCES
          3 BIDI            1             63

      VARIABLES      SN   TYPE            RELOCATION
        236  ACAP         REAL               VARBLS       REFS         2
        334  BGMA         REAL       ARRAY   BODY         REFS         8
        237  B2           REAL               VARBLS       REFS         2
      12446  DELY         REAL       ARRAY   VARBLS       REFS         2
       7346  EV           REAL       ARRAY   VARBLS       REFS         2
        240  FL           REAL               VARBLS       REFS         2
      13514  GGMA         REAL       ARRAY   VARBLS       REFS         2
        244  GMA          REAL       ARRAY   VARBLS       REFS         2
        216  I            INTEGER                         REFS        23       2*24      2*25       26        28        30        37
                                                            38      2*39        46        48      2*49        50        58
                                                       DEFINED        22        36        45        47        57
        213  IBTAPE       INTEGER                         REFS        26        37        43        50        58
                                                       DEFINED        19   I/O REFS       62
          5  IQ           INTEGER            VARBLS       REFS         2
          6  IR           INTEGER            VARBLS       REFS         2
        221  ITAPE        INTEGER                         REFS        28        40        51   DEFINED        26        37        50
                                                            58  I/O REFS        27        29        59
          0  ITAPES       INTEGER    ARRAY   CTAPES       REFS        10        12        18        19
        224  J            INTEGER                      DEFINED        34        44
        225  JB           INTEGER                         REFS        40        41        42        43   DEFINED        35        41
                                                            42
        226  JP           INTEGER                         REFS        51        55   DEFINED        48        53
          7  JSPECS       INTEGER            VARBLS       REFS         2
        227  J1           INTEGER                         REFS        55   DEFINED        54
        242  KR           INTEGER            VARBLS       REFS         2
        243  KRDBR        INTEGER            VARBLS       REFS         2
        222  MK           INTEGER                         REFS      2*31   DEFINED        30
        215  MMRK         INTEGER                         REFS        31        54   DEFINED        21        31
        360  MRK          INTEGER    ARRAY   BODY         REFS         8        21      2*25        30        48      2*49
        212  MTAP15       INTEGER                         REFS        55   DEFINED        18  I/O REFS        61
        223  N            INTEGER                         REFS        56   DEFINED        33
          1  NB           INTEGER            VARBLS       REFS         2        22        36        47        57
        154  NBARAY       INTEGER    ARRAY   VARBLS       REFS         2
        310  NBEA         INTEGER    ARRAY   BODY         REFS         8        23        24        38        39
         10  NCARAY       INTEGER    ARRAY   VARBLS       REFS         2
          0  NCNSM1       INTEGER            VARBLS       REFS         2        20        53
          3  NDATA        INTEGER            VARBLS       REFS         2
          2  NDELT        INTEGER            VARBLS       REFS         2
```

AD-A152 270 ESP (EXTERNAL-STORES PROGRAM) - A PILOT COMPUTER PROGRAM FOR DETERMINING..(U) GRUMMAN AEROSPACE CORP BETHPAGE NY J B SMEDFJELD FEB 85 ADCR-85-1-VOL-3-PT-1 7/8

UNCLASSIFIED N00019-81-C-0395 F/G 9/2 NL



MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS

```
VARIABLES     SN  TYPE          RELOCATION
                                                DEFINED      23         24        38        39
   220  NIB        INTEGER                        REFS       28         51   DEFINED        25        49
     0  NM         INTEGER              F.P.      REFS       28         33        56   DEFINED         1
     4  NOPAN      INTEGER             VARBLS     REFS        2
     0  NPOINT     INTEGER              F.P.      REFS       28    DEFINED         1
    72  NSARAY     INTEGER     ARRAY   VARBLS     REFS        2
     0  NTBOX      INTEGER              F.P.      REFS       53    DEFINED         1
   214  NTEL       INTEGER                        REFS       28         32   DEFINED        20        32
   241  PI         REAL                VARBLS     REFS        2
 10166  PV         REAL        ARRAY   VARBLS     REFS        2
  3426  P1         REAL        ARRAY   VARBLS     REFS        2
  5706  P2         REAL        ARRAY   VARBLS     REFS        2
     0  RO         REAL        ARRAY   BODY       REFS        8
   144  ROP        REAL        ARRAY   BODY       REFS        8
 11626  SDELX      REAL        ARRAY   VARBLS     REFS        2
   326  X          REAL        ARRAY   VARBLS     REFS        2
   430  XBO        REAL        ARRAY   BODY       REFS        8
   230  XI         REAL        ARRAY              REFS       11         40        43        51        55
                                                DEFINED      46
 13266  XO         REAL        ARRAY   VARBLS     REFS        2
  1146  Y          REAL        ARRAY   VARBLS     REFS        2
   454  YBO        REAL        ARRAY   BODY       REFS        8
 13350  YO         REAL        ARRAY   VARBLS     REFS        2
   500  ZBO        REAL        ARRAY   BODY       REFS        8
 11006  ZV         REAL        ARRAY   VARBLS     REFS        2
  1766  ZZ         REAL        ARRAY   VARBLS     REFS        2
  4246  ZZ1        REAL        ARRAY   VARBLS     REFS        2
  6526  ZZ2        REAL        ARRAY   VARBLS     REFS        2
 13432  ZO         REAL        ARRAY   VARBLS     REFS        2
  2606  Z1         REAL        ARRAY   VARBLS     REFS        2
  5066  Z2         REAL        ARRAY   VARBLS     REFS        2
        VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS          TYPE    ARGS         REFERENCES
        BEIN                 7               28
        RNRW                 3               40        43        51        55

STATEMENT LABELS                DEF LINE    REFERENCES
     0  1                           32           22
   145  2                           60           33        56
     0  3                           43           34
     0  4                           41           36
     0  5                           55           44
     0  6                           52           47
     0  7                           46           45
     0  8                           59           57

LOOPS  LABEL     INDEX      FROM-TO     LENGTH    PROPERTIES
    15  1         I          22 32        31B               EXT REFS
    47  2         N          33 60       101B               EXT REFS  NOT INNER
    50  3         J          34 43        27B               EXT REFS  NOT INNER
    52  4         I          36 41        17B               EXT REFS
   100  5         J          44 55        33B               EXT REFS  NOT INNER
   103  7         I          45 46         2B     INSTACK
   107  6         I          47 52        14B               EXT REFS
   136  8         I          57 59         7B               EXT REFS
```

```
COMMON BLOCKS   LENGTH     MEMBERS - BIAS NAME(LENGTH)
    VARBLS       6014               0 NCNSM1 (1)            1 NB      (1)             2 NDELT  (1)
                                    3 NDATA  (1)            4 NOPAN   (1)             5 IQ     (1)
                                    6 IR     (1)            7 JSPECS  (1)             8 NCARAY (50)
                                   58 NSARAY (50)         108 NBARAY  (50)          158 ACAP   (1)
                                  159 B2     (1)          160 FL      (1)           161 PI     (1)
                                  162 KR     (1)          163 KRDBR   (1)           164 GMA    (50)
                                  214 X      (400)        614 Y       (400)        1014 ZZ     (400)
                                 1414 Z1     (400)       1814 P1      (400)        2214 ZZ1    (400)
                                 2614 Z2     (400)       3014 P2      (400)        3414 ZZ2    (400)
                                 3814 EV     (400)       4214 PV      (400)        4614 ZV     (400)
                                 5014 SDELX  (400)       5414 DELY    (400)        5814 XO     (50)
                                 5864 YO     (50)        5914 ZO      (50)         5964 GGMA   (50)
    BODY          340               0 RO     (100)        100 ROP     (100)         200 NBEA   (20)
                                  220 BGMA   (20)         240 MRK     (40)          280 XBO    (20)
                                  300 YBO    (20)         320 ZBO     (20)
    CTAPES         50               0 ITAPES (50)

STATISTICS
  PROGRAM LENGTH              1056B     558
  CM LABELED COMMON LENGTH   14404B    6404
         52000B CM USED
```

```
      SUBROUTINE BEIN (NF,NM,ITAPE,NPOINT,NIB,NEL,NTEL)
C
      COMMON /VARBLS / NCNSM1,NB,NDELT,NDATA,NOPAN,IQ,IR,JSPECS,
     1                 NCARAY(50),NSARAY(50),NBARAY(50),ACAP,B2,FL,PI,
     2                KR,KRDBR,GMA(50),X(400),Y(400),ZZ(400),Z1(400),
     3                P1(400),ZZ1(400),Z2(400),P2(400),ZZ2(400),
     4                EV(400),PV(400),ZV(400),SDELX(400),DELY(400),
     5                XO(50),YO(50),ZO(50),GGMA(50)
      COMMON/BODY/ RO(100), ROP(100), NBEA(20), BGMA(20), MRK(20,2),
     1            XBO(20), YBO(20), ZBO(20)
      COMMON /MODD  / BPR, DETAD, WW, OMG, NC
      COMMON / COMA  / LC, BR
      COMMON/CHSP/ KDEG
      COMMON / CTAPES / ITAPES
C
      DIMENSION LC(40)
      DIMENSION QZ(220)
      DIMENSION WW(40,40), OMG(40)
      DIMENSION XGP(20), DEFL(20), AN(3), D(20,5)
      DIMENSION A(50), B(50), C(50)
      DIMENSION BB(50), BQ(400), DH1(400), DH2(50), H(400)
      DIMENSION ITAPES(50)
C
      COMPLEX   BPR(40,40), DETAD(40,40)
C
      EQUIVALENCE(BB(1), A(1)), (DH2(1),B(1))
C
C
      ITAPER = ITAPES(5)
      ITAPEW = ITAPES(6)
      MTAP49 =  ITAPES(49)
C
C
C
C        LID  LIST MODAL INPUT DATA
C        LOD  LIST MODAL OUTPUT DATA
C
      LID = LC(23)
      LOD = LC(24)
      KDEG = 2
      READ (ITAPER,62) NGP,NSTRIP,IPANEL
      READ (ITAPER,63)(XGP(I), I = 1,NGP)
      NBPS = NIB/NSTRIP
      WRITE (ITAPEW,400) NF
      B22 = B2*B2
      REWIND MTAP49
      DO 150 M = 1,NM
      CALL RNRW (-MTAP49,QZ,NC)
      IF(LID.EQ.0) GO TO 8
      WRITE (ITAPEW,450)  M
    8 CONTINUE
      DO 151 N = 1,NGP
      NN  = NPOINT + N
      IF(LID.EQ.0) GO TO 151
      WRITE (ITAPEW,451) NN, XGP(N), QZ(NN)
  151 DEFL(N)  =  QZ(NN)
      KIND = -1
```

```
      ID = 7
      EPS = 0.01
      XGP1 = XGP(1)
      D(1,1) = 0.0
      D(1,2) = 0.0
      D(NGP,1) = 0.0
      D(NGP,2) = 0.0
      F =XGP1
      CALL SPLIT3 (XGP,DEFL,NGP,D,KIND,IND,20,F,AN,ID,EPS,1)
      DO 160 N = 1,NEL
      NN  = NTEL + N
      F = EV(NN)
      LIND = 2
      CALL SPLIT3 (XGP,DEFL,NGP,D,LIND,IND,20,F,AN,ID,EPS,2)
      BB(N) = DELY(NN) *SDELX(NN) * AN(1) / B22
      IF (ABS(Y(NN)).LT.0.0001) BB(N) = 0.5*BB(N)
      F = X(NN)
      CALL SPLIT3 (XGP,DEFL,NGP,D,LIND,IND,20,F,AN,ID,EPS,2)
      H(N) = AN(1)
      DH1(N) = AN(2) * B2
  160 DH2(N) = AN(3) * B2
      CALL RNRW (ITAPE,BB,NEL)
      CALL RNRW (ITAPE,H,NEL)
      CALL RNRW (ITAPE,DH1,NEL)
      CALL RNRW (ITAPE,DH2,NEL)
      IF (LOD.EQ.0) GO TO 10
      WRITE (ITAPEW,550) M
      DO 11 N = 1,NEL
      NN = NTEL + N
   11 WRITE (ITAPEW,551) NN, X(NN), BB(N), H(N), DH1(N), DH2(N)
   10 CONTINUE
      WRITE (ITAPEW,553) IND
      II = MRK(NF,1) - 1
      DO 12 N = 1,NBPS
      NN = II + N
      F = EV(NN)
      CALL SPLIT3 (XGP,DEFL,NGP,D,LIND,IND,20,F,AN,ID,EPS,2)
      A(N) = AN(1) / B22
      F = X(NN)
      CALL SPLIT3 (XGP,DEFL,NGP,D,LIND,IND,20,F,AN,ID,EPS,2)
      B(N) = AN(1)
   12 C(N) = AN(2) * B2
      IF (LOD.NE.0) WRITE (ITAPEW,552)
      IS = IPANEL
      DO 15 J = 1,NSTRIP
      IF(BGMA(NF).EQ. 0) FAC = COS(GMA(IS))
      IF(BGMA(NF).NE. 0) FAC =-SIN(GMA(IS))
      IS = IS + 1
      JJ = (J-1)* NBPS
      II = MRK(NF,1) + JJ - 1
      DO 16 N = 1,NBPS
      NN = II + N
      MM = JJ + N
      BQ(MM) = A (N) * FAC * SDELX(NN) * DELY(NN)
      H(MM) = B (N) *FAC
      DH1(MM)= C (N) * FAC
```

```
               WRITE (ITAPEW,551) NN,EV(NN), X(NN), BQ(MM), H(MM), DH1(MM)         BEIN    116
            16 CONTINUE                                                            BEIN    117
            15 CONTINUE                                                            BEIN    1:8
               WRITE (ITAPEW,553) IND                                              BEIN    119
               CALL RNRW (ITAPE, BQ,NIB)                                           BEIN    120
               CALL RNRW (ITAPE,  H,NIB)                                           BEIN    121
               CALL RNRW (ITAPE,DH1,NIB)                                           BEIN    122
         C                                                                         BEIN    123
           150 CONTINUE                                                            BEIN    124
               REWIND MTAP49                                                       BEIN    125
               REWIND ITAPE                                                        BEIN    126
               NPOINT = NPOINT + NGP                                               BEIN    127
         C                                                                         BEIN    128
         C                                                                         BEIN    129
         C FORMATS                                                                 BEIN    130
         C                                                                         BEIN    131
            62 FORMAT (10I5)                                                       BEIN    132
            63 FORMAT (6E10.3)                                                     BEIN    133
           400 FORMAT (1H1,19X, 11HBODY NUMBER,I4, //)                             BEIN    134
           450 FORMAT (//15X, 25HINPUT MODAL DATA FOR MODE, I4, //                 BEIN    135
              1        10X,5HPOINT,15X,1HX,10X,10HDEFLECTION, //)                  BEIN    136
           451 FORMAT (11X,I4,2(5X,E16.7))                                         BEIN    137
           550 FORMAT (1H1,2X, 32HINTERPOLATED MODAL DATA FOR MODE, I4, //         BEIN    138
              1 1X,7HELEMENT,7X,2HXX,14X,2HBB,15X,1HH,14X,3HDH1,14X,3HDH2,//)      BEIN    139
           551 FORMAT (2X,I4,3X,7(E14.7,2X))                                       BEIN    140
           552 FORMAT (//3X,3HBOX,9X,2HEV,15X,1HX,14X,2HBQ,15X,1HH,14X,3HDH1)      BEIN    141
           553 FORMAT (//5X,5HIND =,I2)                                            BEIN    142
         C                                                                         BEIN    143
               RETURN                                                              BEIN    144
               END                                                                 BEIN    145
```

SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS	DEF LINE	REFERENCES
3 BEIN	1	143

VARIABLES		SN TYPE		RELOCATION								
632	A	REAL	ARRAY		REFS	20	26	111	DEFINED	95		
236	ACAP	REAL		VARBLS	REFS	3						
1402	AN	REAL	ARRAY		REFS	19	66	71	72	75	76	77
					78	94	95	97	98	99		
714	B	REAL	ARRAY		REFS	20	26	112	DEFINED	98		
632	BB	REAL	ARRAY		REFS	21	26	73	79	87		
					DEFINED	72	73					
334	BGMA	REAL	ARRAY	BODY	REFS	9	103	104				
0	BPR	COMPLEX	ARRAY	MODD	REFS	11	24					
1633	BQ	REAL	ARRAY		REFS	21	115	119	DEFINED	111		
50	BR	REAL		COMA	REFS	12						
237	B2	REAL		VARBLS	REFS	3	2*45	77	78	99		
611	B22	REAL			REFS	72	95	DEFINED	45			
1551	C	REAL	ARRAY		REFS	20	113	DEFINED	99			
1405	D	REAL	ARRAY		REFS	19	66	71	75	94	97	
					DEFINED	61	62	63	64			

```
 VARIABLES   SN  TYPE           RELOCATION
  1356  DEFL      REAL       ARRAY             REFS      19      66      71      75      94      97
                                             DEFINED     56
 12446  DELY      REAL       ARRAY   VARBLS    REFS       3      72     111
  6200  DETAD     COMPLEX    ARRAY   MODD      REFS      11      24
  2453  DH1       REAL       ARRAY             REFS      21      81      87     115     121
                                             DEFINED     77     113
   714  DH2       REAL       ARRAY             REFS      21      26      82      87  DEFINED     78
   617  EPS       REAL                         REFS      66      71      75      94      97
                                             DEFINED     59
  7346  EV        REAL       ARRAY   VARBLS    REFS       3      69      93     115
   621  F         REAL                         REFS      66      71      75      94      97
                                             DEFINED     65      69      74      93      96
   627  FAC       REAL                         REFS     111     112     113  DEFINED    103     104
   240  FL        REAL               VARBLS    REFS       3
 13514  GGMA      REAL       ARRAY   VARBLS    REFS       3
   244  GMA       REAL       ARRAY   VARBLS    REFS       3     103     104
  3273  H         REAL       ARRAY             REFS      21      80      87     115     120
                                             DEFINED     76     112
   607  I         INTEGER                      REFS      42  DEFINED     42
   616  ID        INTEGER                      REFS      66      71      75      94      97
                                             DEFINED     58
   624  II        INTEGER                      REFS      92     109  DEFINED     90     107
   622  IND       INTEGER                      REFS      66      71      75      89      94      97     118
   606  IPANEL    INTEGER                      REFS     101  DEFINED     41
     5  IQ        INTEGER            VARBLS    REFS       3
     6  IR        INTEGER            VARBLS    REFS       3
   625  IS        INTEGER                      REFS     103     104     105  DEFINED    101     105
     0  ITAPE     INTEGER              F.P.    REFS      79      80      81      82     119     120     121
                                             DEFINED      1  I/O REFS   125
   577  ITAPER    INTEGER                    DEFINED     29  I/O REFS    41      42
     0  ITAPES    INTEGER    ARRAY   CTAPES    REFS      14      22      29      30      31
   600  ITAPEW    INTEGER                    DEFINED     30  I/O REFS    44      50      55      84      87
                                                  89    100     115     118
   626  J         INTEGER                      REFS     106  DEFINED    102
   630  JJ        INTEGER                      REFS     107     110  DEFINED    106
     7  JSPECS    INTEGER            VARBLS    REFS       3
     0  KDEG      INTEGER            CHSP      REFS      13  DEFINED     40
   615  KIND      INTEGER                      REFS      66  DEFINED     57
   242  KR        INTEGER            VARBLS    REFS       3
   243  KRDBR     INTEGER            VARBLS    REFS       3
     0  LC        INTEGER    ARRAY   COMA      REFS      12      16      38      39
   602  LID       INTEGER                      REFS      49      54  DEFINED     38
   623  LIND      INTEGER                      REFS      71      75      94      97  DEFINED     70
   603  LOD       INTEGER                      REFS      83     100     114  DEFINED     39
   612  M         INTEGER                      REFS      50      84  DEFINED     47
   631  MM        INTEGER                      REFS     111     112     113   3*115  DEFINED    110
   360  MRK       INTEGER    ARRAY   BODY      REFS       9      90     107
   601  MTAP49    INTEGER                      REFS      48  DEFINED     31  I/O REFS    46     124
   613  N         INTEGER                      REFS      53      55      56      68      72    2*73      76
                                                  77     78      86    4*87      92      95      98      99
                                                 109    110     111     112     113  DEFINED     52      67
                                                  85     91     108
     1  NB        INTEGER            VARBLS    REFS       3
   154  NBARAY    INTEGER    ARRAY   VARBLS    REFS       3
   310  NBEA      INTEGER    ARRAY   BODY      REFS       9
   610  NBPS      INTEGER                      REFS      91     106     108  DEFINED     43
 17550  NC        INTEGER            MODD      REFS      11      48
```

```
VARIABLES      SN  TYPE             RELOCATION
    10  NCARAY     INTEGER    ARRAY   VARBLS      REFS         3
     0  NCNSM1     INTEGER            VARBLS      REFS         3
     3  NDATA      INTEGER            VARBLS      REFS         3
     2  NDELT      INTEGER            VARBLS      REFS         3
     0  NEL        INTEGER             F.P.       REFS        67      79      80      81      82      85
                                               DEFINED         1
     0  NF         INTEGER             F.P.       REFS        44      90     103     104     107
                                               DEFINED         1
   604  NGP        INTEGER                        REFS        42      52      63      64      66      71      75
                                                    94        97     126 DEFINED      41
     0  NIB        INTEGER             F.P.       REFS        43     119     120     121 DEFINED       1
     0  NM         INTEGER             F.P.       REFS        47 DEFINED       1
   614  NN         INTEGER                        REFS      2*55      56      69    2*72      73      74    2*87
                                                    93        96   2*111   3*115 DEFINED      53      68      86
                                                    92       109
     4  NOPAN      INTEGER            VARBLS      REFS         3
     0  NPOINT     INTEGER             F.P.       REFS        53     126 DEFINED       1     126
    72  NSARAY     INTEGER    ARRAY   VARBLS      REFS         3
   605  NSTRIP     INTEGER                        REFS        43     102 DEFINED      41
     0  NTEL       INTEGER             F.P.       REFS        68      86 DEFINED       1
 17500  OMG        REAL       ARRAY   MODD        REFS        11      18
   241  PI         REAL               VARBLS      REFS         3
 10166  PV         REAL       ARRAY   VARBLS      REFS         3
  3426  P1         REAL       ARRAY   VARBLS      REFS         3
  5706  P2         REAL       ARRAY   VARBLS      REFS         3
   776  QZ         REAL       ARRAY               REFS        17      48      55      56
     0  RO         REAL       ARRAY   BODY        REFS         9
   144  ROP        REAL       ARRAY   BODY        REFS         9
 11626  SDELX      REAL       ARRAY   VARBLS      REFS         3      72     111
 14400  WW         REAL       ARRAY   MODD        REFS        11      18
   326  X          REAL       ARRAY   VARBLS      REFS         3      74      87      96     115
   430  XBO        REAL       ARRAY   BODY        REFS         9
  1332  XGP        REAL       ARRAY               REFS        19      55      60      66      71      75      94
                                                    97   DEFINED      42
   620  XGP1       REAL                           REFS        65 DEFINED      60
 13266  XO         REAL       ARRAY   VARBLS      REFS         3
  1146  Y          REAL       ARRAY   VARBLS      REFS         3      73
   454  YBO        REAL       ARRAY   BODY        REFS         9
 13350  YO         REAL       ARRAY   VARBLS      REFS         3
   500  ZBO        REAL       ARRAY   BODY        REFS         9
 11006  ZV         REAL       ARRAY   VARBLS      REFS         3
  1766  ZZ         REAL       ARRAY   VARBLS      REFS         3
  4246  ZZ1        REAL       ARRAY   VARBLS      REFS         3
  6526  ZZ2        REAL       ARRAY   VARBLS      REFS         3
 13432  ZO         REAL       ARRAY   VARBLS      REFS         3
  2606  Z1         REAL       ARRAY   VARBLS      REFS         3
  5066  Z2         REAL       ARRAY   VARBLS      REFS         3
        VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS           TYPE   ARGS       REFERENCES
        COS         REAL     1 LIBRARY    103
        RNRW                 3             48      79      80      81      82     119     120     121
        SIN         REAL     1 LIBRARY    104
        SPLIT3              12             66      71      75      94      97
```

```
INLINE FUNCTIONS    TYPE    ARGS          DEF LINE  REFERENCES
       ABS          REAL      1  INTRIN                 73

STATEMENT LABELS              DEF LINE    REFERENCES
   44  8                           51          49
  172  10                          88          83
    0  11                          87          85
    0  12                          99          91
    0  15                         117         102
  271  16                         116         108        114
  516  62         FMT             131          41
  520  63         FMT             132          42
    0  150                        123          47
   55  151                         56          52         54
    0  160                         78          67
  522  400        FMT             133          44
  526  450        FMT             134          50
  537  451        FMT             136          55
  542  550        FMT             137          84
  555  551        FMT             139          87        115
  560  552        FMT             140         100
  566  553        FMT             141          89        118

LOOPS  LABEL      INDEX     FROM-TO     LENGTH     PROPERTIES
   36  150        M          47  123      261B              EXT REFS  NOT INNER
   45  151        N          52  56        15B              EXT REFS
   75  160        N          67  78        32B              EXT REFS
  153  11         N          85  87        17B              EXT REFS
  177  12         N          91  99        21B              EXT REFS
  225  15         J         102  117       51B              EXT REFS  NOT INNER
  244  16         N         108  116       30B              EXT REFS

COMMON BLOCKS     LENGTH     MEMBERS - BIAS NAME(LENGTH)
       VARBLS     6014                  0 NCNSM1 (1)                1 NB      (1)               2 NDELT   (1)
                                        3 NDATA  (1)                4 NOPAN   (1)               5 IQ      (1)
                                        6 IR     (1)                7 JSPECS  (1)               8 NCARAY  (50)
                                       58 NSARAY (50)             108 NBARAY  (50)            158 ACAP    (1)
                                      159 B2     (1)              160 FL      (1)             161 PI      (1)
                                      162 KR     (1)              163 KRDBR   (1)             164 GMA     (50)
                                      214 X      (400)            614 Y       (400)          1014 ZZ      (400)
                                     1414 Z1     (400)           1814 P1      (400)          2214 ZZ1     (400)
                                     2614 Z2     (400)           3014 P2      (400)          3414 ZZ2     (400)
                                     3814 EV     (400)           4214 PV      (400)          4614 ZV      (400)
                                     5014 SDELX  (400)           5414 DELY    (400)          5814 XO      (50)
                                     5864 YO     (50)            5914 ZO      (50)           5964 GGMA    (50)
       BODY        340                  0 RO     (100)            100 ROP     (100)           200 NBEA    (20)
                                      220 BGMA   (20)             240 MRK     (40)            280 XBO     (20)
                                      300 YBO    (20)             320 ZBO     (20)
       MODD       8041                  0 BPR    (3200)          3200 DETAD   (3200)         6400 WW      (1600)
                                     8000 OMG    (40)            8040 NC      (1)
       COMA         41                  0 LC     (40)              40 BR      (1)
       CHSP          1                  0 KDEG   (1)
       CTAPES       50                  0 ITAPES (50)

EQUIV CLASSES     LENGTH     MEMBERS - BIAS NAME(LENGTH)
       BB           50                  0 A      (50)
       DH2          50                  0 B      (50)
```

```
STATISTICS
  PROGRAM LENGTH                4144B     2148
  CM LABELED COMMON LENGTH     34227B    14487
        52000B CM USED
```

```
      SUBROUTINE SPLIT3 (X,F,N,D,KIND,IND,L,ARGT,AN,K,EPS,KSPLIT)       SPLIT3   2
C         X     ARRAY OF INDEPENDENT VARIABLE, DIMENSION N              SPLIT3   3
C         F     ARRAY OF FUNCTIONAL VALUES FOR EACH X, DIMENSION N      SPLIT3   4
C         N     NUMBER OF VALUES IN TABLE                               SPLIT3   5
C         D     WORK AREA TO SOLVE FOR SECOND DERIVATIVES WHICH ARE     SPLIT3   6
C               RETURNED IN THE FIRST N LOCATIONS   DIMENSION IN THE    SPLIT3   7
C               CALLING PROGRAM TO AT LEAST 5*N                         SPLIT3   8
C        KIND=-1 D(1,1),D(1,2),D(N,1),D(N,2) ARE INITIALIZED TO THE     SPLIT3   9
C                 VALUES Q1,F1,Q2,F2 SUCH THAT D(1)=F1*D2+Q1  AND       SPLIT3  10
C                 D(N)=F2*D(N-1)+Q2                                     SPLIT3  11
C              =0 D(1,2),D(N,2) ARE INITIALIZED TO PRESCRIBED VALUES    SPLIT3  12
C                   FOR FIRST DERIVATIVES AT X(1) AND X(N)              SPLIT3  13
C              =+1 PERIODIC FUNCTION  F(1)=F(N)    D(1)=D(N)            SPLIT3  14
C                   PERIOD = X(N)-X(1)                                  SPLIT3  15
C              =+2  EXTRAPOLATION,   QUADRATIC FIT                      SPLIT3  16
C              =+3  EXTRAPOLATION,   SAME FIT AS END SEGMENT            SPLIT3  17
C              =+4  NO EXTRAPOLATION                                    SPLIT3  18
C        ARGT  VALUE AT WHICH INTERPOLATION IS PERFORMED                SPLIT3  19
C        IND  1-MATRIX SINGULAR        O-NON-SINGULAR                   SPLIT3  20
C        ANS   ARRAY FOR INTERPOLATED VALUES OF FUNCTION, FIRST         SPLIT3  21
C                AND SECOND DERIVATIVES                                 SPLIT3  22
C        K       OPTION INDICATOR WHICH VALUES ARE DESIRED              SPLIT3  23
C                  1    FUNCTION                                        SPLIT3  24
C                  2    FIRST DERIVATIVE                                SPLIT3  25
C                  4    SECOND DERIVATIVE                               SPLIT3  26
      DIMENSION X(1), F(1), D(L,1)                                      SPLIT3  27
     *     ,ANS(3)                                                      SPLIT3  28
      DIMENSION AN(1)                                                   SPLIT3  29
      GO TO (100, 111),  KSPLIT                                         SPLIT3  30
  100 'EY  =  2                                                         SPLIT3  31
      NN=N-1                                                            SPLIT3  32
      NNN=NN                                                            SPLIT3  33
      M=1                                                               SPLIT3  34
      DS1=D(1,2)                                                        SPLIT3  35
      DSN=D(N,2)                                                        SPLIT3  36
      IF(KIND) 42,43,44                                                 SPLIT3  37
   42 D(1,4)=1.                                                         SPLIT3  38
      D(1,5)=-DS1                                                       SPLIT3  39
      GO TO 43                                                          SPLIT3  40
   44 S= X(2)-X(1)                                                      SPLIT3  41
      SR=(F(2)-F(1))/S                                                  SPLIT3  42
      GO TO 45                                                          SPLIT3  43
   43 S=X(2)-X(1)                                                       SPLIT3  44
      IF(KIND.EQ.O) D(1,4)=S/3.                                         SPLIT3  45
      SR=(F(2)-F(1))/S                                                  SPLIT3  46
      IF(KIND.EQ.O) D(1,1)=SR-DS1                                       SPLIT3  47
   45 IF(KIND.GE.O) D(1,5)=S/6.                                         SPLIT3  48
      S1= S                                                             SPLIT3  49
      DO 1 I=2,NN                                                       SPLIT3  50
      D(I-1,3)=S/6.                                                     SPLIT3  51
      SR1=SR                                                            SPLIT3  52
      S=X(I+1)-X(I)                                                     SPLIT3  53
      SR=(F(I+1)-F(I))/S                                                SPLIT3  54
      D(I,4)=(X(I+1)-X(I-1))/3.                                         SPLIT3  55
      D(I,5)=S/6.                                                       SPLIT3  56
    1 D(I,1)=SR-SR1                                                     SPLIT3  57
      IF(KIND) 52,53,54                                                 SPLIT3  58
```

```
   52 D(NN,3)=-DSN                                                       SPLIT3   59
      D(N,4)= 1.                                                         SPLIT3   60
      GO TO 55                                                           SPLIT3   61
   53 D(NN,3)=D(NN,5)                                                    SPLIT3   62
      D(N,4)=S/3                                                         SPLIT3   63
      D(N,1)=DSN-SR                                                      SPLIT3   64
   55 KEY=1                                                              SPLIT3   65
      NN=N                                                               SPLIT3   66
      GO TO 10                                                           SPLIT3   67
   54 M=2                                                                SPLIT3   68
      D(2,2)=-D(1,3)                                                     SPLIT3   69
      NN=NN-1                                                            SPLIT3   70
      IF (NN.LT.3) GO TO 152                                             SPLIT3   71
      DO 6 I=3,NN                                                        SPLIT3   72
    6 D(I,2)=0.                                                          SPLIT3   73
  152 D(NN+1,2)=-D(NN+1,5)                                               SPLIT3   74
      GO TO 10                                                           SPLIT3   75
   10 CALL TRIDI(D(KEY,3),D(KEY,4),D(KEY,5),D(KEY,1),NN,M,L,EPS,IND)     SPLIT3   76
      IF (IND.NE.O)RETURN                                                SPLIT3   77
      IF (KIND) 19,98,21                                                 SPLIT3   78
   19 I=2                                                                SPLIT3   79
      II=1                                                               SPLIT3   80
      ARG=X(1)                                                           SPLIT3   81
      KK=2                                                               SPLIT3   82
      GO TO 2                                                            SPLIT3   83
   56 D(II,2)=ANS(2)                                                     SPLIT3   84
      IF(II.NE.1) GO TO 97                                               SPLIT3   85
      I=N                                                                SPLIT3   86
      II=N                                                               SPLIT3   87
      ARG=X(N)                                                           SPLIT3   88
      GO TO 2                                                            SPLIT3   89
   98 D(1,2)=DS1                                                         SPLIT3   90
      D(N,2)=DSN                                                         SPLIT3   91
   97 D(1,3)=D(1,1)/2.                                                   SPLIT3   92
      D(1,4)=D(N,1)/2.                                                   SPLIT3   93
      D(2,3)=D(1,2)-D(1,1)*X(1)                                          SPLIT3   94
      D(2,4)=D(N,2)-D(N,1)*X(N)                                          SPLIT3   95
      D(3,3)=F(1)-X(1)*(D(1,2)-D(1,3)*X(1))                              SPLIT3   96
      D(3,4)=F(N)-X(N)*(D(N,2)-D(1,4)*X(N))                              SPLIT3   97
      GO TO 999                                                          SPLIT3   98
   21 SR=SR-(F(2)-F(N))/S1                                               SPLIT3   99
      SR = D(2,1)*S1/6. + D(N-1,1)*S/6. + SR                             SPLIT3  100
      SD = D(2,2)*S1/6. + D(N-1,2)*S/6. + (S+S1)/3.                      SPLIT3  101
      D(1,1) = -SR/SD                                                    SPLIT3  102
      D(N,1) = D(1,1)                                                    SPLIT3  103
      DO 22 I=2,NNN                                                      SPLIT3  104
   22 D(I,1)=D(I,1) + D(1,1)*D(I,2)                                      SPLIT3  105
      GO TO 999                                                          SPLIT3  106
  111 CONTINUE                                                           SPLIT3  107
      KK=K                                                               SPLIT3  108
      ARG=ARGT                                                           SPLIT3  109
      I=1                                                                SPLIT3  110
      IF(X(1)-ARG) 9,33,30                                               SPLIT3  111
    9 DO 8 I=2,N                                                         SPLIT3  112
      IF(X(I)-ARG) 8,33,2                                                SPLIT3  113
    8 CONTINUE                                                           SPLIT3  114
```

```
      GO TO 30                                                          SPLIT3    116
    2 AR=X(I)-ARG                                                       SPLIT3    117
      AG=ARG-X(I-1)                                                     SPLIT3    118
      H=X(I)-X(I-1)                                                     SPLIT3    119
      TT1=AR*D(I-1,1)/H                                                 SPLIT3    120
      TT2=AG*D(I,1)/H                                                   SPLIT3    121
      GO TO (5,4,4,3,3,3,3),KK                                          SPLIT3    122
    3 ANS(3)=TT1+TT2                                                    SPLIT3    123
      GO TO (5,99,5,90,5,4,4),KK                                        SPLIT3    124
    4 ANS(2)=(TT2*AG-TT1*AR)*.5+(F(I)-F(I-1))/H+H*(D(I-1,1)-D(I,1))/6.  SPLIT3    125
      GO TO (5,99,5,90,5,90,5),KK                                       SPLIT3    126
    5 TT1=TT1*AR*AR                                                     SPLIT3    127
      TT2=TT2*AG*AG                                                     SPLIT3    128
      ANS(1)=(TT1+TT2)/6.+AG*(F(I)/H-H*D(I,1)/6.)                       SPLIT3    129
     *          +AR*(F(I-1)/H-D(I-1,1)*H/6.)                            SPLIT3    130
      GO TO 90                                                          SPLIT3    131
   33 ANS(1)=F(I)                                                       SPLIT3    132
      ANS(3)=D(I,1)                                                     SPLIT3    133
      KK  =  ANDOR(K,2,0)                                               SPLIT3    134
                                                                        SPLIT3    135
      IF(KK.NE.2) GO TO 99                                              SPLIT3    136
      IF(I.NE.1.AND.I.NE.N) GO TO 2                                     SPLIT3    137
      ANS(2)=D(I,2)                                                     SPLIT3    138
      GO TO 99                                                          SPLIT3    139
   30 GO TO (16,27,7,999),KIND                                          SPLIT3    140
   16 PERIOD =X(N) - X(1)                                               SPLIT3    141
      AR=AMOD(ARG-X(1),PERIOD)                                          SPLIT3    142
      IF(AR.LT.O )AR=PERIOD+AR                                          SPLIT3    143
      ARG=X(1)+AR                                                       SPLIT3    144
      GO TO 9                                                           SPLIT3    145
    7 IF(I.EQ.1) I=2                                                    SPLIT3    146
      GO TO 2                                                           SPLIT3    147
   27 M=3                                                               SPLIT3    148
      IF(I.EQ.N) M=4                                                    SPLIT3    149
      ANS(1)=D(3,M)+ARG*(D(2,M)+ARG*D(1,M))                             SPLIT3    150
      ANS(2)=D(I,1)*ARG+D(2,M)                                          SPLIT3    151
      ANS(3)=D(I,1)                                                     SPLIT3    152
   99 IF (KIND) 56,56,90                                                SPLIT3    153
   90 AN(1) = ANS(1)                                                    SPLIT3    154
      AN(2)=ANS(2)                                                      SPLIT3    155
      AN(3)=ANS(3)                                                      SPLIT3    156
  999 RETURN                                                            SPLIT3    157
      END                                                               SPLIT3    158
```

CARD NR	SEVERITY	DETAILS	DIAGNOSIS OF PROBLEM
29	I		AN IF STATEMENT MAY BE MORE EFFICIENT THAN A 2 OR 3 BRANCH COMPUTED GO TO STATEMENT.
40	I	X	ARRAY REFERENCE OUTSIDE DIMENSION BOUNDS.
41	I	F	ARRAY REFERENCE OUTSIDE DIMENSION BOUNDS.
43	I	X	ARRAY REFERENCE OUTSIDE DIMENSION BOUNDS.
45	I	F	ARRAY REFERENCE OUTSIDE DIMENSION BOUNDS.
98	I	F	ARRAY REFERENCE OUTSIDE DIMENSION BOUNDS.
154	I	AN	ARRAY REFERENCE OUTSIDE DIMENSION BOUNDS.
155	I	AN	ARRAY REFERENCE OUTSIDE DIMENSION BOUNDS.

```
COMMON BLOCKS   LENGTH     MEMBERS - BIAS NAME(LENGTH)
                                 5014 SDELX  (400)          5414 DELY    (400)          5814 XO      (50)
                                 5864 YO     (50)           5914 ZO      (50)           5964 GGMA    (50)
      BODY         340              0 RO     (100)           100 ROP     (100)           200 NBEA    (20)
                                  220 BGMA   (20)            240 MRK     (40)            280 XBO     (20)
                                  300 YBO    (20)            320 ZBO     (20)
      XYZ          350              0 YS     (50)             50 DELYS   (50)            100 ZS      (50)
                                  150 DELZS  (50)            200 FGAMMA  (50)            250 CWIG    (50)
                                  300 FGGAM  (50)
      XXZ          450              0 XOC    (400)           400 XIJ     (50)
      CTAPES        50              0 ITAPES (50)

STATISTICS
  PROGRAM LENGTH                  547B     359
  CM LABELED COMMON LENGTH      16044B    7204
        52000B CM USED
```

```
VARIABLES      SN   TYPE            RELOCATION
11006  ZV           REAL       ARRAY     VARBLS      REFS         2         46         60       104   DEFINED        58        104
 1766  ZZ           REAL       ARRAY     VARBLS      REFS         2         43         60       103   DEFINED        55        103
 4246  ZZ1          REAL       ARRAY     VARBLS      REFS         2         44         60   DEFINED        56
 6526  ZZ2          REAL       ARRAY     VARBLS      REFS         2         45         60   DEFINED        57
13432  ZO           REAL       ARRAY     VARBLS      REFS         2         27
  515  ZOO          REAL                             REFS        29         55         56        57        58        79        103
                                                      104       106    DEFINED         27        97
 2606  Z1           REAL       ARRAY     VARBLS      REFS         2         48         60   DEFINED        48
 5066  Z2           REAL       ARRAY     VARBLS      REFS         2         49         60   DEFINED        49
       VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS          TYPE    ARGS        REFERENCES
       COS          REAL      1 LIBRARY       24        71
       SIN          REAL      1 LIBRARY       23        72

INLINE FUNCTIONS   TYPE    ARGS          DEF LINE  REFERENCES
       ABS          REAL      1  INTRIN                    80         81

STATEMENT LABELS                DEF LINE   REFERENCES
    0  1                              87        22
   37  2                              36        33
   42  3                              37        35
  160  4                              63        38        59
  251  5                              86        70        83
    0  6                             107        89
  265  7                              93        90
  270  8                              94        92
    0  9                             105        98
  323  10                            108        88
   33  11                             32        30
  175  12                             69        67
  423  700      FMT                  114        29
  437  701      FMT                  116        21
  441  702      FMT                  117       106
  451  703      FMT                  119        60        84
  454  704      FMT                  120       109
  456  705      FMT                  121        68
  473  706      FMT                  124        31

LOOPS  LABEL     INDEX      FROM-TO     LENGTH     PROPERTIES
   13  1         NP          22 87       243B                EXT REFS  NOT INNER
   45  4         J           38 63       116B                EXT REFS
  177  5         I           70 86        55B                EXT REFS
  260  6         N           89 107       43B                EXT REFS  NOT INNER
  304  9         K           98 105       11B        OPT

COMMON BLOCKS    LENGTH      MEMBERS - BIAS NAME(LENGTH)
       VARBLS      6014              0 NCNSM1 (1)              1 NB      (1)              2 NDELT  (1)
                                     3 NDATA  (1)              4 NOPAN   (1)              5 IQ     (1)
                                     6 IR     (1)              7 JSPECS  (1)              8 NCARAY (50)
                                    58 NSARAY (50)           108 NBARAY  (50)           158 ACAP   (1)
                                   159 B2     (1)            160 FL      (1)            161 PI     (1)
                                   162 KR     (1)            163 KRDBR   (1)            164 GMA    (50)
                                   214 X      (400)          614 Y       (400)         1014 ZZ     (400)
                                  1414 Z1     (400)         1814 P1      (400)         2214 ZZ1    (400)
                                  2614 Z2     (400)         3014 P2      (400)         3414 ZZ2    (400)
                                  3814 FV     (400)         4214 PV      (400)         4614 ZV     (400)
```

```
VARIABLES      SN  TYPE            RELOCATION
       7  JSPECS    INTEGER              VARBLS     REFS           2
     517  J1        INTEGER                         REFS          38   DEFINED       34        36
     520  J2        INTEGER                         REFS          38        91       93        94   DEFINED        37
     541  K         INTEGER                         REFS        2*99     2*100    2*101     2*102     2*103     2*104
                                                 DEFINED          98
     242  KR        INTEGER              VARBLS     REFS           2
     243  KRDBR     INTEGER              VARBLS     REFS           2
     537  K1        INTEGER                         REFS          98   DEFINED       91        93
     540  K2        INTEGER                         REFS          98   DEFINED       94
       0  LC12      INTEGER              F.P.       REFS          30        59       67        83   DEFINED         1
     360  MRK       INTEGER    ARRAY     BODY       REFS           8
     536  N         INTEGER                         REFS          90        93       94        95        96        97       106
                                                 DEFINED          89
       1  NB        INTEGER              VARBLS     REFS           2        88       89
     154  NBARAY    INTEGER    ARRAY     VARBLS     REFS           2        36       37
     310  NBEA      INTEGER    ARRAY     BODY       REFS           8        93       94
      10  NCARAY    INTEGER    ARRAY     VARBLS     REFS           2
       0  NCNSM1    INTEGER              VARBLS     REFS           2
       3  NDATA     INTEGER              VARBLS     REFS           2
       2  NDELT     INTEGER              VARBLS     REFS           2
       4  NOPAN     INTEGER              VARBLS     REFS           2        22
     510  NP        INTEGER                         REFS          23        24       25        26        27        28        29
                                                      33          36        37       65      3*66      2*68
                                                 DEFINED          22
      72  NSARAY    INTEGER    ARRAY     VARBLS     REFS           2        65
     241  PI        REAL                 VARBLS     REFS           2
   10166  PV        REAL       ARRAY     VARBLS     REFS           2        42       60       102   DEFINED        54       102
    3426  P1        REAL       ARRAY     VARBLS     REFS           2        40       60   DEFINED        52
    5706  P2        REAL       ARRAY     VARBLS     REFS           2        41       60   DEFINED        53
       0  RO        REAL       ARRAY     BODY       REFS           8
     144  ROP       REAL       ARRAY     BODY       REFS           8
   11626  SDELX     REAL       ARRAY     VARBLS     REFS           2
     511  SS        REAL                            REFS          51        52       53        54        55        56        57
                                                      58          78        79       80        81   DEFINED        23        72
     326  X         REAL       ARRAY     VARBLS     REFS           2        47       60        99   DEFINED        47        99
     430  XBO       REAL       ARRAY     BODY       REFS           8        95
     620  XIJ       REAL       ARRAY     XXZ        REFS          12        77       84   DEFINED        77
       0  XOC       REAL       ARRAY     XXZ        REFS          12
   13266  XO        REAL       ARRAY     VARBLS     REFS           2        25
     513  XOO       REAL                            REFS          29        47       48        49        50        77        99
                                                     100         106   DEFINED       25        95
    1146  Y         REAL       ARRAY     VARBLS     REFS           2        39       60       101   DEFINED        51       101
     454  YBO       REAL       ARRAY     BODY       REFS           8        96
     522  YC        REAL                            REFS          51        55       78        79   DEFINED        39        73
     525  YCV       REAL                            REFS          54        58  DEFINED        42
     523  YC1       REAL                            REFS          52        56  DEFINED        40
     524  YC2       REAL                            REFS          53        57  DEFINED        41
       0  YS        REAL       ARRAY     XYZ        REFS          10        73       84   DEFINED        78
   13350  YO        REAL       ARRAY     VARBLS     REFS           2        26
     514  YOO       REAL                            REFS          29        51       52        53        54        78       101
                                                     102         106   DEFINED       26        96
     500  ZBO       REAL       ARRAY     BODY       REFS           8        97
     526  ZC        REAL                            REFS          51        55       78        79   DEFINED        43        74
     531  ZCV       REAL                            REFS          54        58  DEFINED        46
     527  ZC1       REAL                            REFS          52        56  DEFINED        44
     530  ZC2       REAL                            REFS          53        57  DEFINED        45
     144  ZS        REAL       ARRAY     XYZ        REFS          10        74       84   DEFINED        79
```

```
                 1CHES ,   3(2X,F10.2), /30X, 20HDIHEDRAL IN DEGREES , F10.2)        GLOBAL     116
             701 FORMAT (1H1)                                                         GLOBAL     117
             702 FORMAT (1HO,10X, 11HBODY NUMBER, I4, 30H.  APEX COORDINATES IN INC GLOBAL     118
                 1HES ,   3(2X,F10.2))                                                GLOBAL     119
             703 FORMAT (2X,I4,12(1X,F9.3))                                           GLOBAL     120
             704 FORMAT (1H1)                                                         GLOBAL     121
             705 FORMAT (1HO,2X,5HPANEL,I4, 25HTOTAL DIHEDRAL IN RADIANS, E14.6,//  GLOBAL     122
                 1  1X,5HSTRIP,3X,3HXIJ,8X,2HYS,8X,2HZS,5X,5HDELYS,5X,5HDELZS,5X,     GLOBAL     123
                 2  6HFGAMMA,//)                                                      GLOBAL     124
             706 FORMAT (1HO,3X, 3HBOX, 4X,1HX,9X,2HX1, 8X,2HX2,8X,2HXV,8X,1HY,9X,  GLOBAL     125
                 1          2HY1,8X,2HY2,8X,2HYV,8X,1HZ,8X,2HZ1,8X,2HZ2,8X,2HZV,//)  GLOBAL     126
            C                                                                         GLOBAL     127
                 RETURN                                                               GLOBAL     128
                 END                                                                  GLOBAL     129
```

```
    SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS      DEF LINE      REFERENCES
    3  GLOBAL          1         127

VARIABLES       SN  TYPE             RELOCATION
  236  ACAP         REAL                  VARBLS       REFS        2
  334  BGMA         REAL         ARRAY    BODY         REFS        8
  237  B2           REAL                  VARBLS       REFS        2
  512  CS           REAL                               REFS       51       52       53       54       55       56       57
                                                          58       78       79       80       81  DEFINED       24       71
  372  CWIG         REAL         ARRAY    XYZ          REFS       10
12446  DELY         REAL         ARRAY    VARBLS       REFS        2
  534  DELYC        REAL                               REFS       80       81  DEFINED       75
   62  DELYS        REAL         ARRAY    XYZ          REFS       10       75       84  DEFINED       80
  535  DELZC        REAL                               REFS       80       81  DEFINED       76
  226  DELZS        REAL         ARRAY    XYZ          REFS       10       76       84  DEFINED       81
 7346  EV           REAL         ARRAY    VARBLS       REFS        2       50       60      100  DEFINED       50      100
  310  FGAMMA       REAL         ARRAY    XYZ          REFS       10       82       84  DEFINED       82
  454  FGGAM        REAL         ARRAY    XYZ          REFS       10       71       72       82
  240  FL           REAL                  VARBLS       REFS        2
13514  GGMA         REAL         ARRAY    VARBLS       REFS        2       23       24       28       66
  516  GGMAS        REAL                               REFS       29  DEFINED       28
  244  GMA          REAL         ARRAY    VARBLS       REFS        2       66       68  DEFINED       66
  533  I            INTEGER                            REFS       71       72       73       74       75       76     2*77
                                                          78       79       80       81     3*82     7*84
                                                     DEFINED      70
    5  IQ           INTEGER               VARBLS       REFS        2
    6  IR           INTEGER               VARBLS       REFS        2
    0  ITAPES       INTEGER      ARRAY    CTAPES       REFS       13       14       17
  506  ITAPEW       INTEGER                          DEFINED      17  I/O REFS       21       29       31       60       68
                                                          84      106      109
  532  I1           INTEGER                            REFS       70  DEFINED       64
  507  I2           INTEGER                            REFS       64       65       70  DEFINED       20       65
  521  J            INTEGER                            REFS       39       40       41       42       43       44       45
                                                          46     2*47     2*48     2*49     2*50       51       52       53
                                                          54       55       56       57       58    13*60
                                                     DEFINED      38
```

```
      ZV (J) = ZOO + ZCV*CS + YCV*SS
      IF (LC12.EQ.0) GO TO 4
      WRITE (ITAPEW,703) J,    X(J),   Z1(J),   Z2(J),    EV(J)
     1                   ,    Y(J),   P1(J),   P2(J),    PV(J)
     2                   ,   ZZ(J),  ZZ1(J),  ZZ2(J),    ZV(J)
    4 CONTINUE
      I1 = I2 + 1
      I2 = I2 + NSARAY(NP) - 1
      GMA(NP) = GMA(NP) + GGMA(NP)
      IF (LC12.EQ.0) GO TO 12
      WRITE (ITAPEW,705) NP, GMA(NP)
   12 CONTINUE
      DO 5 I = I1,I2
      CS = COS (FGGAM (I))
      SS = SIN (FGGAM (I))
      YC = YS(I)
      ZC = ZS(I)
      DELYC = DELYS(I)
      DELZC = DELZS(I)
      XIJ(I)  = XOO + XIJ(I)
      YS (I) = YOO + YC*CS - ZC*SS
      ZS (I) = ZOO + ZC*CS + YC*SS
      DELYS(I) = ABS( DELYC*CS - DELZC*SS )
      DELZS (I) = ABS( DELYC*SS + DELZC*CS )
      FGAMMA(I) = FGAMMA(I) + FGGAM(I)
      IF (LC12.EQ.0) GO TO 5
      WRITE (ITAPEW,703) I, XIJ(I), YS(I), ZS(I), DELYS(I), DELZS(I),
     1                   FGAMMA(I)
    5 CONTINUE
    1 CONTINUE
      IF (NB.EQ.0) GO TO 10
      DO 6  N = 1,NB
      IF (N.GT.1) GO TO 7
      K1 = J2 + 1
      GO TO 8
    7 K1 = J2 + NBEA(N-1) + 1
    8 K2 = J2 + NBEA(N)
      XOO = XBO(N)
      YOO = YBO(N)
      ZOO = ZBO(N)
      DO 9  K = K1,K2
      X  (K)  = XOO + X  (K)
      EV (K)  = XOO + EV (K)
      Y  (K)  = YOO + Y  (K)
      PV (K)  = YOO + PV (K)
      ZZ (K)  = ZOO + ZZ (K)
      ZV (K)  = ZOO + ZV (K)
    9 CONTINUE
      WRITE (ITAPEW,702) N, XOO, YOO, ZOO
    6 CONTINUE
   10 CONTINUE
      WRITE (ITAPEW,704)
C
C
C FORMATS
C
```

```
      SUBROUTINE GLOBAL (LC12)                                          GLOBAL     2
      COMMON /VARBLS / NCNSM1,NB,NDELT,NDATA,NOPAN,IQ,IR,JSPECS,        GLOBAL     3
     1                 NCARAY(50),NSARAY(50),NBARAY(50),ACAP,B2,FL,PI,  GLOBAL     4
     2                 KR,KRDBR,GMA(50),X(400),Y(400),ZZ(400),Z1(400),  GLOBAL     5
     3                 P1(400),ZZ1(400),Z2(400),P2(400),ZZ2(400),       GLOBAL     6
     4                 EV(400),PV(400),ZV(400),SDELX(400),DELY(400),    GLOBAL     7
     5                 XO(50),YO(50),ZO(50),GGMA(50)                    GLOBAL     8
      COMMON/BODY/ RO(100), ROP(100), NBEA(20), BGMA(20), MRK(20,2),    GLOBAL     9
     1             XBO(20), YBO(20), ZBO(20)                            GLOBAL    10
      COMMON /XYZ/YS(50),DELYS(50),ZS(50),DELZS(50),FGAMMA(50),         GLOBAL    11
     1            CWIG(50), FGGAM(50)                                   GLOBAL    12
      COMMON  /XXZ/  XOC(400),XIJ(50)                                   GLOBAL    13
      COMMON / CTAPES / ITAPES                                          GLOBAL    14
      DIMENSION ITAPES(50)                                              GLOBAL    15
C                                                                       GLOBAL    16
C                                                                       GLOBAL    17
      ITAPEW = ITAPES(6)                                                GLOBAL    18
C                                                                       GLOBAL    19
C                                                                       GLOBAL    20
      I2 = 0                                                            GLOBAL    21
      WRITE (ITAPEW,701)                                                GLOBAL    22
      DO 1 NP = 1,NOPAN                                                 GLOBAL    23
      SS = SIN(GGMA(NP))                                                GLOBAL    24
      CS  = COS(GGMA(NP))                                               GLOBAL    25
      XOO = XO(NP)                                                      GLOBAL    26
      YOO = YO(NP)                                                      GLOBAL    27
      ZOO = ZO(NP)                                                      GLOBAL    28
      GGMAS = GGMA (NP) * 57.29578                                      GLOBAL    29
      WRITE (ITAPEW,700) NP, XOO, YOO, ZOO, GGMAS                       GLOBAL    30
      IF (LC12.EQ.0) GO TO 11                                           GLOBAL    31
      WRITE (ITAPEW,706)                                                GLOBAL    32
   11 CONTINUE                                                          GLOBAL    33
      IF (NP.GT.1) GO TO 2                                              GLOBAL    34
      J1 = 1                                                            GLOBAL    35
      GO TO 3                                                           GLOBAL    36
    2 J1 = NBARAY(NP-1) + 1                                             GLOBAL    37
    3 J2 = NBARAY(NP)                                                   GLOBAL    38
      DO 4 J = J1,J2                                                    GLOBAL    39
      YC  = Y  (J)                                                      GLOBAL    40
      YC1 = P1 (J)                                                      GLOBAL    41
      YC2 = P2 (J)                                                      GLOBAL    42
      YCV = PV (J)                                                      GLOBAL    43
      ZC  = ZZ  (J)                                                     GLOBAL    44
      ZC1 = ZZ1 (J)                                                     GLOBAL    45
      ZC2 = ZZ2 (J)                                                     GLOBAL    46
      ZCV = ZV  (J)                                                     GLOBAL    47
      X  (J)  = XOO + X  (J)                                            GLOBAL    48
      Z1 (J)  = XOO + Z1 (J)                                            GLOBAL    49
      Z2 (J)  = XOO + Z2 (J)                                            GLOBAL    50
      EV (J)  = XOO + EV (J)                                            GLOBAL    51
      Y  (J) = YOO + YC *CS - ZC *SS                                    GLOBAL    52
      P1 (J) = YOO + YC1*CS - ZC1*SS                                    GLOBAL    53
      P2 (J) = YOO + YC2*CS - ZC2*SS                                    GLOBAL    54
      PV (J) = YOO + YCV*CS - ZCV*SS                                    GLOBAL    55
      ZZ (J) = ZOO + ZC *CS + YC *SS                                    GLOBAL    56
      ZZ1(J) = ZOO + ZC1*CS + YC1*SS                                    GLOBAL    57
      ZZ2(J) = ZOO + ZC2*CS + YC2*SS                                    GLOBAL    58
```

```
STATISTICS
  PROGRAM LENGTH                733B      475
  CM LABELED COMMON LENGTH    13660B     6064
          52000B CM USED
```

```
VARIABLES      SN  TYPE           RELOCATION
  104  M        *  INTEGER                          DEFINED      18
    1  NB          INTEGER                VARBLS       REFS       2
  154  NBARAY      INTEGER      ARRAY     VARBLS       REFS       2
   10  NCARAY      INTEGER      ARRAY     VARBLS       REFS       2
    0  NCNSM1      INTEGER                VARBLS       REFS       2        11        23
    3  NDATA       INTEGER                VARBLS       REFS       2
    2  NDELT       INTEGER                VARBLS       REFS       2
  100  NINP        INTEGER                             REFS      22    DEFINED     11
    0  NM          INTEGER                 F.P.        REFS      18    DEFINED      1
    4  NOPAN       INTEGER                VARBLS       REFS       2
   72  NSARAY      INTEGER      ARRAY     VARBLS       REFS       2
    0  NTBOX       INTEGER                 F.P.        REFS      11        20        21    DEFINED       1
  106  NT1         INTEGER                             REFS      22    DEFINED     20
  241  PI          REAL                   VARBLS       REFS       2
10166  PV          REAL         ARRAY     VARBLS       REFS       2
 3426  P1          REAL         ARRAY     VARBLS       REFS       2
 5706  P2          REAL         ARRAY     VARBLS       REFS       2
11626  SDELX       REAL         ARRAY     VARBLS       REFS       2
  326  X           REAL         ARRAY     VARBLS       REFS       2
  107  XI          REAL         ARRAY                  REFS      10        21        22        23
13266  XO          REAL         ARRAY     VARBLS       REFS       2
 1146  Y           REAL         ARRAY     VARBLS       REFS       2
13350  YO          REAL         ARRAY     VARBLS       REFS       2
11006  ZV          REAL         ARRAY     VARBLS       REFS       2
 1766  ZZ          REAL         ARRAY     VARBLS       REFS       2
 4246  ZZ1         REAL         ARRAY     VARBLS       REFS       2
 6526  ZZ2         REAL         ARRAY     VARBLS       REFS       2
13432  ZO          REAL         ARRAY     VARBLS       REFS       2
 2606  Z1          REAL         ARRAY     VARBLS       REFS       2
 5066  Z2          REAL         ARRAY     VARBLS       REFS       2
       VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS           TYPE   ARGS       REFERENCES
       RNRW                 3             21        22        23

STATEMENT LABELS            DEF LINE   REFERENCES
    0  1                       24         18
    0  2                       23         19

LOOPS  LABEL    INDEX     FROM-TO     LENGTH    PROPERTIES
   23  1        M          18 24        23B               EXT REFS  NOT INNER
   24  2        I          19 23        20B               EXT REFS

COMMON BLOCKS    LENGTH      MEMBERS - BIAS NAME(LENGTH)
       VARBLS     6014                 0 NCNSM1 (1)              1 NB     (1)              2 NDELT  (1)
                                       3 NDATA  (1)              4 NDPAN  (1)              5 IQ     (1)
                                       6 IR     (1)              7 JSPECS (1)              8 NCARAY (50)
                                      58 NSARAY (50)           108 NBARAY (50)           158 ACAP   (1)
                                     159 B2     (1)            160 FL     (1)            161 PI     (1)
                                     162 KR     (1)            163 KRDBR  (1)            164 GMA    (50)
                                     214 X      (400)          614 Y      (400)         1014 ZZ     (400)
                                    1414 Z1     (400)         1814 P1     (400)         2214 ZZ1    (400)
                                    2614 Z2     (400)         3014 P2     (400)         3414 ZZ2    (400)
                                    3814 EV     (400)         4214 PV     (400)         4614 ZV     (400)
                                    5014 SDELX  (400)         5414 DELY   (400)         5814 XO     (50)
                                    5864 YO     (50)          5914 ZO     (50)          5964 GGMA   (50)
       CTAPES      50                  0 ITAPES (50)
```

```
      SUBROUTINE  MERGE (NM,NTBOX)                                    MERGE      2
      COMMON /VARBLS / NCNSM1,NB,NDELT,NDATA,NOPAN,IQ,IR,JSPECS,      MERGE      3
     1                 NCARAY(50),NSARAY(50),NBARAY(50),ACAP,B2,FL,PI, MERGE     4
     2                KR,KRDBR,GMA(50),X(400),Y(400),ZZ(400),Z1(400), MERGE      5
     3                P1(400),ZZ1(400),Z2(400),P2(400),ZZ2(400),      MERGE      6
     4                 EV(400),PV(400),ZV(400),SDELX(400),DELY(400),  MERGE      7
     5                 XO(50),YO(50),ZO(50),GGMA(50)                  MERGE      8
      COMMON / CTAPES / ITAPES                                        MERGE      9
      DIMENSION ITAPES(50)                                            MERGE     10
      DIMENSION XI(400)                                               MERGE     11
      NINP = NCNSM1 - NTBOX                                           MERGE     12
      ITAPE  =  ITAPES(27)                                            MERGE     13
      ISTAPE =  ITAPES(34)                                            MERGE     14
      INTAPE =  ITAPES(35)                                            MERGE     15
      REWIND  ITAPE                                                   MERGE     16
      REWIND ISTAPE                                                   MERGE     17
      REWIND INTAPE                                                   MERGE     18
      DO 1 M = 1,NM                                                   MERGE     19
      DO 2 I = 1,3                                                    MERGE     20
      NT1 = NTBOX + 1                                                 MERGE     21
      CALL RNRW (-ISTAPE,XI(1),NTBOX)                                 MERGE     22
      CALL RNRW (-INTAPE,XI(NT1),NINP)                                MERGE     23
    2 CALL RNRW  (ITAPE,XI(1),NCNSM1)                                 MERGE     24
    1 CONTINUE                                                        MERGE     25
      REWIND  ITAPE                                                   MERGE     26
      REWIND INTAPE                                                   MERGE     27
      REWIND ISTAPE                                                   MERGE     28
      RETURN                                                          MERGE     29
      END                                                             MERGE     30
```

SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS		DEF LINE	REFERENCES
3	MERGE	1	28

VARIABLES		SN	TYPE		RELOCATION								
236	ACAP		REAL		VARBLS	REFS	2						
237	B2		REAL		VARBLS	REFS	2						
12446	DELY		REAL	ARRAY	VARBLS	REFS	2						
7346	EV		REAL	ARRAY	VARBLS	REFS	2						
240	FL		REAL		VARBLS	REFS	2						
13514	GGMA		REAL	ARRAY	VARBLS	REFS	2						
244	GMA		REAL	ARRAY	VARBLS	REFS	2						
105	I	*	INTEGER			DEFINED	19						
103	INTAPE		INTEGER			REFS	22	DEFINED	14	I/O REFS	17	26	
5	IQ		INTEGER		VARBLS	REFS	2						
6	IR		INTEGER		VARBLS	REFS	2						
102	ISTAPE		INTEGER			REFS	21	DEFINED	13	I/O REFS	16	27	
101	ITAPE		INTEGER			REFS	23	DEFINED	12	I/O REFS	15	25	
0	ITAPES		INTEGER	ARRAY	CTAPES	REFS	8	9	12	13	14		
7	JSPECS		INTEGER		VARBLS	REFS	2						
242	KR		INTEGER		VARBLS	REFS	2						

```
LOOPS  LABEL    INDEX     FROM-TO    LENGTH    PROPERTIES
   22  20       J           5 6          3B     INSTACK
   27  30       I           7 12        27B               EXITS   NOT INNER
   47  30       J          11 12         4B     INSTACK
   61  40       I          14 17        17B             NOT INNER
   71  40       J          16 17         3B     INSTACK

STATISTICS
  PROGRAM LENGTH                132B      90
          52000B CM USED
```

```
      SUBROUTINE TRIDI (A,B,C,R,N,M,L,EPS,IND)                          TRIDI     2
      DIMENSION A(1),B(1),C(1),R(L,1)                                   TRIDI     3
      IND=0                                                             TRIDI     4
      IF( ABS(B(1)).LT.EPS)GO TO 60                                     TRIDI     5
      DO 20 J=1,M                                                       TRIDI     6
   20 R(1,J)=R(1,J)/B(1)                                                TRIDI     7
      DO 30 I=2,N                                                       TRIDI     8
      C(I-1)=C(I-1)/B(I-1)                                              TRIDI     9
      B(I)=B(I)-A(I-1)*C(I-1)                                           TRIDI    10
      IF( ABS(B(1)).LT.EPS)GO TO 60                                     TRIDI    11
      DO 30 J=1,M                                                       TRIDI    12
   30 R(I,J)=(R(I,J)-A(I-1)*R(I-1,J))/B(I)                              TRIDI    13
      II=N                                                              TRIDI    14
      DO 40 I=2,N                                                       TRIDI    15
      II=II-1                                                           TRIDI    16
      DO 40 J=1,M                                                       TRIDI    17
   40 R(II,J)=R(II,J)-C(II)*R(II+1,J)                                   TRIDI    18
   50 RETURN                                                            TRIDI    19
   60 IND=1                                                             TRIDI    20
      GO TO 50                                                          TRIDI    21
      END                                                               TRIDI    22
```

```
     SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS     DEF LINE     REFERENCES
   3  TRIDI          1           18

VARIABLES     SN  TYPE             RELOCATION
    0  A           REAL      ARRAY    F.P.      REFS        2       9      12   DEFINED      1
    0  B           REAL      ARRAY    F.P.      REFS        2       4       6       8        9      10      12
                                             DEFINED        1       9
    0  C           REAL      ARRAY    F.P.      REFS        2       8       9      17   DEFINED      1       8
    0  EPS         REAL               F.P.      REFS        4      10  DEFINED      1
  107  I           INTEGER                      REFS      3*8     4*9    5*12   DEFINED      7      14
  110  II          INTEGER                      REFS       15    4*17  DEFINED     13       15
    0  IND         INTEGER            F.P.   DEFINED        1       3      19
  106  J           INTEGER                      REFS      2*6    3*12    3*17   DEFINED      5      11      16
    0  L           INTEGER            F.P.      REFS        2  DEFINED      1
    0  M           INTEGER            F.P.      REFS        5      11      16   DEFINED      1
    0  N           INTEGER            F.P.      REFS        7      13      14   DEFINED      1
    0  R           REAL      ARRAY    F.P.      REFS        2       6    2*12    2*17   DEFINED      1       6
                                                 12        17

INLINE FUNCTIONS    TYPE    ARGS        DEF LINE   REFERENCES
       ABS          REAL      1  INTRIN               4       10

STATEMENT LABELS              DEF LINE    REFERENCES
    0  20                        6           5
    0  30                       12           7       11
    0  40                       17          14       16
  100  50                       18          20
  101  60                       19           4       10
```

```
LOOPS  LABEL   INDEX   FROM-TO    LENGTH   PROPERTIES
  103  1       I        49 56       14B       OPT
  162  6       I        71 72        2B     INSTACK
  317  22      I       103 104       3B     INSTACK
  332  8       I       111 113       6B     INSTACK    EXITS

STATISTICS
  PROGRAM LENGTH              646B     422
          52000B CM USED
```

```
VARIABLES      SN  TYPE            RELOCATION
                                                55        62        99     2*100   DEFINED       40        43        52
  627  SD          REAL                       REFS       101   DEFINED       100
  620  SR          REAL                       REFS        46        51        56        63        98        99       101
                                           DEFINED        41        45        53        98        99
  623  SR1         REAL                       REFS        56   DEFINED        51
  621  S1          REAL                       REFS        98        99     2*100   DEFINED       48
  633  TT1         REAL                       REFS       122       124       126       128   DEFINED       119       126
  634  TT2         REAL                       REFS       122       124       127       128   DEFINED       120       127
    0  X           REAL       ARRAY     F.P.  REFS        26      2*40      2*43      2*52      2*54        80        87
                                                93        94      2*95      2*96       110       112       116       117
                                             2*118     2*140       141       143   DEFINED         1

EXTERNALS            TYPE    ARGS        REFERENCES
       ANDOR         REAL      3            133
       TRIDI                   9             75

INLINE FUNCTIONS     TYPE    ARGS       DEF LINE  REFERENCES
       AMOD          REAL      2  INTRIN               141

STATEMENT LABELS              DEF LINE    REFERENCES
    0  1                          56          49
  342  2                         116          82        88       112       136       146
  370  3                         122       4*121
  406  4                         124       2*121     2*123
  436  5                         126         121     3*123     4*125
    0  6                          72          71
  530  7                         145         139
    0  8                         113         111       112
  331  9                         111         110       144
  171  10                         75          66        74
  513  16                        140         139
    0  19          INACTIVE       78          77
  267  21                         98          77
    0  22                        104         103
  534  27                        147         139
  502  30                        139         110       115
  457  33                        131         110       112
    0  42          INACTIVE       37          36
   44  43                         43          36        39
   36  44                         40          36
   62  45                         47          42
    0  52          INACTIVE       58          57
  131  53                         61          57
  147  54                         67          57
  144  55                         64          60
  217  56                         83       2*152
  554  90                        153         123     2*125       130       152
  235  97                         91          84
  230  98                         89          77
  552  99                        152         123       125       135       138
   17  100                        30          29
  323  111                       106          29
  165  152                        73          70
  560  999                       156          97       105       139
```

```
      SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS      DEF LINE      REFERENCES
    3  SPLIT3          1          76        156

VARIABLES       SN  TYPE           RELOCATION
  631  AG           REAL                          REFS       120       124     2*127       128   DEFINED       117
    O  AN           REAL       ARRAY      F.P.    REFS        28   DEFINED         1       153       154       155
  636  ANS          REAL       ARRAY              REFS        26        83       153       154       155
                                               DEFINED       122       124       128       131       132       137       149
                                                   150       151
  630  AR           REAL                          REFS       119       124     2*126       128     2*142       143
                                               DEFINED       116       141       142
  625  ARG          REAL                          REFS       110       112       116       117       141     2*149       150
                                               DEFINED        80        87       108       143
    O  ARGT         REAL                  F.P.    REFS       108   DEFINED         1
    O  D            REAL       ARRAY      F.P.    REFS        26        34        35        61        68        73      4*75
                                                    91        92      2*93      2*94      2*95      2*96      2*99     2*100
                                                   102     3*104       119       120     2*124     2*128       132       137
                                                 3*149     2*150       151   DEFINED         1        37        38        44
                                                    46        47        50        54        55        56        58        59
                                                    61        62        63        68        72        73        83        89
                                                    90        91        92        93        94        95        96       101
                                                   102       104
  616  DSN          REAL                          REFS        58        63        90   DEFINED        35
  615  DS1          REAL                          REFS        38        46        89   DEFINED        34
    O  EPS          REAL                  F.P.    REFS        75   DEFINED         1
    O  F            REAL       ARRAY      F.P.    REFS        26      2*41      2*45      2*53        95        96      2*98
                                                 2*124     2*128       131   DEFINED         1
  632  H            REAL                          REFS       119       120     2*124     4*128   DEFINED       118
  622  I            INTEGER                       REFS        50      2*52      2*53      3*54        55        56        72
                                                 3*104       112       116       117     2*118       119       120     4*124
                                                 4*128       131       132     2*136       137       145       148       150
                                                   151   DEFINED        49        71        78        85       103       109
                                                   111       114       145
  624  II           INTEGER                       REFS        83        84   DEFINED        79        86
    O  IND          INTEGER               F.P.    REFS        75        76   DEFINED         1
    O  K            INTEGER               F.P.    REFS       107       133   DEFINED         1
  611  KEY          INTEGER                       REFS      4*75   DEFINED        30        64
    O  KIND         INTEGER               F.P.    REFS        36        44        46        47        57        77       139
                                                   152   DEFINED         1
  626  KK           INTEGER                       REFS       121       123       125       135   DEFINED        81       107
                                                   133
    O  KSPLIT       INTEGER               F.P.    REFS        29   DEFINED         1
    O  L            INTEGER               F.P.    REFS        26        75   DEFINED         1
  614  M            INTEGER                       REFS        75     3*149       150   DEFINED        33        67       147
                                                   148
    O  N            INTEGER               F.P.    REFS        31        35        59        62        63        65        85
                                                    86        87        90        92      3*94      4*96        98        99
                                                   100       102       111       114       136       140       148
                                               DEFINED         1
  612  NN           INTEGER                       REFS        32        49        58      2*61        69        70        71
                                                  2*73        75   DEFINED        31        65        69
  613  NNN          INTEGER                       REFS       103   DEFINED        32
  635  PERIOD       REAL                          REFS       141       142   DEFINED       140
  617  S            REAL                          REFS        41        44        45        47        48        50        53
```

```
      SUBROUTINE GENQ(N4,N5,N6,NRF,URF,NBE,     NMD,NMTP,NMTB,NCORE,      GENQ       2
     1          KDO2,YIN,ZIN,COEFP,COEFB)                                 GENQ       3
      COMMON /VARBLS / NCNSM1,NB,NDELT,NDATA,NOPAN,IQ,IR,JSPECS,          GENQ       4
     1                 NCARAY(50),NSARAY(50),NBARAY(50),ACAP,B2,FL,PI,    GENQ       5
     2                KR,KRDBR,GMA(50),X(400),Y(400),ZZ(400),Z1(400),     GENQ       6
     3                 P1(400),ZZ1(400),Z2(400),P2(400),ZZ2(400),         GENQ       7
     4                 EV(400),PV(400),ZV(400),SDELX(400),DELY(400),      GENQ       8
     5                 XO(50),YO(50),ZO(50),GGMA(50)                      GENQ       9
      COMMON /COMA / LC(40), CR                                           GENQ      10
      COMMON/BODY/ RO(100), ROP(100), NBEA(20), BGMA(20), MRK(20,2),      GENQ      11
     1          XBO(20), YBO(20), ZBO(20)                                 GENQ      12
      DIMENSION  N8(80),NARQ(80),LARQ(120,2),YIN(50),ZIN(50),COEFP(50),   GENQ      13
     1          COEFB(20),ARQ(120),BQ(400),H(400),DH1(400),DH2(400)       GENQ      14
      COMMON  /MODE/ N8,NARQ,LARQ,ARQ,H,DH1,DH2                           GENQ      15
      COMMON / CTAPES / ITAPES                                            GENQ      16
      DIMENSION ITAPES(50)                                                GENQ      17
      COMPLEX    WQ(400),          ASUM(400),WW(40)                       GENQ      18
      REAL       KR,KRDBR                                                 GENQ      19
      COMMON/NTPS/ NTP1,NTP2,NTP3,NTP4,NTP5,NTP6,NTP7,NTP8,NTP9,NTP10     GENQ      20
      ITAPEW = ITAPES(6)                                                  GENQ      21
      MTAP20 =  ITAPES(40)                                                GENQ      22
C                                                                         GENQ      23
C                                                                         GENQ      24
      S     = B2                                                          GENQ      25
      BR = CR * 12.0                                                      GENQ      26
      IROW = 1                                                            GENQ      27
      IF (NB.NE.O.OR.NCORE.GT.KDO2.OR.N5.NE.O)  IROW=O                    GENQ      28
      REWIND  NTP2                                                        GENQ      29
      REWIND  NTP3                                                        GENQ      30
      REWIND  NTP4                                                        GENQ      31
      REWIND  NTP8                                                        GENQ      32
      REWIND  NTP10                                                       GENQ      33
      REWIND  NTP7                                                        GENQ      34
      MTAPE  =  ITAPES(27)                                                GENQ      35
      IF (NB .GT. O) REWIND MTAP20                                        GENQ      36
      REWIND  MTAPE                                                       GENQ      37
      NBOX = NCNSM1                                                       GENQ      38
      NTOT = NBOX+NBE                                                     GENQ      39
      NTPB = NTP10                                                        GENQ      40
      NTPW = NTP4                                                         GENQ      41
      II    = O                                                           GENQ      42
      IF (NBE.EQ.O)  GO TO 51                                             GENQ      43
      NTPB = NTP2                                                         GENQ      44
      NTPW = NTP3                                                         GENQ      45
      II    = MRK(1,1)                                                    GENQ      46
      DO  53  K=1,NB                                                      GENQ      47
      IF (K.EQ.NB)  GO TO 53                                              GENQ      48
      KP1   = K+1                                                         GENQ      49
      IF (MRK(KP1,1).GE.MRK(K,1))  GO TO 53                               GENQ      50
      II    = MRK(KP1,1)                                                  GENQ      51
   53 CONTINUE                                                            GENQ      52
   51 CONTINUE                                                            GENQ      53
      IF (II.EQ.O)  II=NBOX+1                                             GENQ      54
      IBF   = NBOX+1                                                      GENQ      55
      IBL   = NTOT                                                        GENQ      56
      DO 200  J=1,NMD                                                     GENQ      57
      READ(MTAPE)  (BQ(I), I = 1,NBOX)                                    GENQ      58
```

```
          READ(MTAPE)   (H(I), I = 1,NBOX)                            GENQ      59
          READ(MTAPE) (DH1(I), I = 1,NBOX)                            GENQ      60
          WRITE (NTPB)  (BQ(I),  I=1,NBOX)                            GENQ      61
          IF (J.EQ.1) WRITE (NTPW) NMD                                GENQ      62
          DO 187  IW=1,NBOX                                           GENQ      63
          WQ(IW) = (0.0,0.0)                                          GENQ      64
          IF (IW.GE.II) GO TO 187                                     GENQ      65
          WRE  = DH1(IW)                                              GENQ      66
          WIM  = (H(IW)*KR*S)/BR                                      GENQ      67
          WQ(IW) = CMPLX(WRE,WIM)                                     GENQ      68
      187 CONTINUE                                                    GENQ      69
          WRITE (NTPW)  (WQ(I),  I=1,NBOX)                            GENQ      70
      200 CONTINUE                                                    GENQ      71
          IF (NBE.EQ.0)  GO TO 700                                    GENQ      72
          REWIND  NTPB                                                GENQ      73
          REWIND  NTPW                                                GENQ      74
          READ (NTPW) NMD                                             GENQ      75
          DO 600  J=1,NMD                                             GENQ      76
          READ  (NTPB)  (BQ(I), I=1,NBOX)                             GENQ      77
          READ  (NTPW)  (WQ(I), I=1,NBOX)                             GENQ      78
          CALL        AUGW(NMD,NBOX,NBE,NMTB,N4,N6,NRF,JRF,J ,COEFB,ASUM) GENQ  79
          DO 525  IX=1,NBOX                                           GENQ      80
          WQ(IX) = WQ(IX) + ASUM(IX)                                  GENQ      81
      525 CONTINUE                                                    GENQ      82
          IF (J.EQ.1)  WRITE (NTP4)  NMD                              GENQ      83
          BACKSPACE  NTP8                                             GENQ      84
          READ  (NTP8)  (BQ(K), K=IBF,IBL)                            GENQ      85
          WRITE (NTP4)  (WQ(I), I=1,NBOX)                             GENQ      86
          WRITE (NTP10) (BQ(I), I=1,NTOT)                             GENQ      87
      600 CONTINUE                                                    GENQ      88
          IF (NCORE.GT.KD02.OR.N5.NE.0)  GO TO 770                    GENQ      89
          NTPW = NTP4                                                 GENQ      90
      700 CONTINUE                                                    GENQ      91
          REWIND  NTP3                                                GENQ      92
          DO 720  I=1,NBOX                                            GENQ      93
          REWIND  NTPW                                                GENQ      94
          READ (NTPW) NMD                                             GENQ      95
          DO 710  J=1,NMD                                             GENQ      96
          READ  (NTPW)  (WQ(K), K=1,NBOX)                             GENQ      97
          WW(J)= WQ(I)                                                GENQ      98
      710 CONTINUE                                                    GENQ      99
          WRITE (NTP3)  (WW(L), L=1,NMD)                              GENQ     100
      720 CONTINUE                                                    GENQ     101
      770 CONTINUE                                                    GENQ     102
C                                                                     GENQ     103
C                                                                     GENQ     104
          RETURN                                                      GENQ     105
          END                                                         GENQ     106
```

SYMBOLIC REFERENCE MAP (R=3)

```
ENTRY POINTS     DEF LINE     REFERENCES
    3  GENQ             1       104

VARIABLES      SN  TYPE              RELOCATION
  236  ACAP        REAL                VARBLS      REFS        3
  620  ARQ         REAL       ARRAY    MODE        REFS       12       14
 2760  ASUM        COMPLEX    ARRAY                REFS       17       78       80
  334  BGMA        REAL       ARRAY    BODY        REFS       10
  500  BQ          REAL       ARRAY                REFS       12       60       86    DEFINED      57      76      84
  455  BR          REAL                            REFS       66  DEFINED       25
  237  B2          REAL                VARBLS      REFS        3       24
    0  COEFB       REAL       ARRAY     F.P.       REFS       12       78  DEFINED        1
    0  COEFP       REAL       ARRAY     F.P.       REFS       12  DEFINED        1
   50  CR          REAL                COMA        REFS        9       25
12446  DELY        REAL       ARRAY    VARBLS      REFS        3
 1630  DH1         REAL       ARRAY    MODE        REFS       12       14       65    DEFINED      59
 2450  DH2         REAL       ARRAY    MODE        REFS       12       14
 7346  EV          REAL       ARRAY    VARBLS      REFS        3
  240  FL          REAL                VARBLS      REFS        3
13514  GGMA        REAL       ARRAY    VARBLS      REFS        3
  244  GMA         REAL       ARRAY    VARBLS      REFS        3
 1010  H           REAL       ARRAY    MODE        REFS       12       14       66    DEFINED      58
  472  I           INTEGER                         REFS       57       58       59       60      69      76      77
                                                     85       86       97  DEFINED       57      58      59      60
                                                     69       76       77       85       86      92
  467  IBF         INTEGER                         REFS       84  DEFINED       54
  470  IBL         INTEGER                         REFS       84  DEFINED       55
  464  II          INTEGER                         REFS       53       64  DEFINED       41      45      50      53
    5  IQ          INTEGER             VARBLS      REFS        3
    6  IR          INTEGER             VARBLS      REFS        3
  456  IROW        INTEGER                      DEFINED       26       27
    0  ITAPES      INTEGER    ARRAY    CTAPES      REFS       15       16       20       21      34
  452  ITAPEW   *  INTEGER                      DEFINED       20
  473  IW          INTEGER                         REFS       63       64       65       66      67
                                                DEFINED       62
  476  IX          INTEGER                         REFS     3*80  DEFINED       79
  471  J           INTEGER                         REFS       61       78       82       97  DEFINED      56      75
                                                     95
    0  JRF         INTEGER              F.P.       REFS       78  DEFINED        1
    7  JSPECS      INTEGER             VARBLS      REFS        3
  465  K           INTEGER                         REFS       47       48       49       84      96
                                                DEFINED       46       84       96
    0  KDO2        INTEGER              F.P.       REFS       27       88  DEFINED        1
  466  KP1         INTEGER                         REFS       49       50  DEFINED       48
  242  KR          REAL                VARBLS      REFS        3       18       66
  243  KRDBR       REAL                VARBLS      REFS        3       18
  477  L           INTEGER                         REFS       99  DEFINED       99
  240  LARQ        INTEGER    ARRAY    MODE        REFS       12       14
    0  LC          INTEGER    ARRAY    COMA        REFS        9
  360  MRK         INTEGER    ARRAY    BODY        REFS       10       45     2*49       50
  457  MTAPE       INTEGER                      DEFINED       34  I/O REFS       36       57      58      59
  453  MTAP20      INTEGER                      DEFINED       21  I/O REFS       35
  120  NARQ        INTEGER    ARRAY    MODE        REFS       12       14
    1  NB          INTEGER             VARBLS      REFS        3       27       35       46      47
  154  NBARAY      INTEGER    ARRAY    VARBLS      REFS        3
    0  NBE         INTEGER              F.P.       REFS       38       42       71       78  DEFINED       1
  310  NBEA        INTEGER    ARRAY    BODY        REFS       10
```

```
VARIABLES        SN  TYPE            RELOCATION
   460  NBOX         INTEGER                          REFS        38       53       54       57       58       59       60
                                                        62        69       76       77       78       79       85       92
                                                        96   DEFINED       37
    10  NCARAY       INTEGER     ARRAY    VARBLS      REFS         3
     0  NCNSM1       INTEGER              VARBLS      REFS         3       37
     0  NCORE        INTEGER               F.P.       REFS        27       88  DEFINED        1
     3  NDATA        INTEGER              VARBLS      REFS         3
     2  NDELT        INTEGER              VARBLS      REFS         3
     0  NMD          INTEGER               F.P.       REFS        56       61       75       78       82       95       99
                                                   DEFINED         1       74       94
     0  NMTB         INTEGER               F.P.       REFS        78  DEFINED        1
     0  NMTP         INTEGER    *UNUSED    F.P.    DEFINED         1
     4  NOPAN        INTEGER              VARBLS      REFS         3
     0  NRF          INTEGER               F.P.       REFS        78  DEFINED        1
    72  NSARAY       INTEGER     ARRAY    VARBLS      REFS         3
   461  NTOT         INTEGER                          REFS        55       86  DEFINED       38
   462  NTPB         INTEGER                       DEFINED        39       43 I/O REFS       60       72       76
   463  NTPW         INTEGER                       DEFINED        40       44       89 I/O REFS       61       69       73
                                                        74        77       93       94       96
     0  NTP1         INTEGER              NTPS        REFS        19
    11  NTP10        INTEGER              NTPS        REFS        19       39 I/O REFS       32       86
     1  NTP2         INTEGER              NTPS        REFS        19       43 I/O REFS       28
     2  NTP3         INTEGER              NTPS        REFS        19       44 I/O REFS       29       91       99
     3  NTP4         INTEGER              NTPS        REFS        19       40       89 I/O REFS       30       82       85
     4  NTP5         INTEGER              NTPS        REFS        19
     5  NTP6         INTEGER              NTPS        REFS        19
     6  NTP7         INTEGER              NTPS        REFS        19 I/O REFS       33
     7  NTP8         INTEGER              NTPS        REFS        19 I/O REFS       31       83       84
    10  NTP9         INTEGER              NTPS        REFS        19
     0  N4           INTEGER               F.P.       REFS        78  DEFINED        1
     0  N5           INTEGER               F.P.       REFS        27       88  DEFINED        1
     0  N6           INTEGER               F.P.       REFS        78  DEFINED        1
     0  N8           INTEGER     ARRAY    MODE        REFS        12       14
   241  PI           REAL                 VARBLS      REFS         3
 10166  PV           REAL        ARRAY    VARBLS      REFS         3
  3426  P1           REAL        ARRAY    VARBLS      REFS         3
  5706  P2           REAL        ARRAY    VARBLS      REFS         3
     0  RO           REAL        ARRAY    BODY        REFS        10
   144  ROP          REAL        ARRAY    BODY        REFS        10
   454  S            REAL                             REFS        66  DEFINED       24
 11626  SDELX        REAL        ARRAY    VARBLS      REFS         3
   475  WIM          REAL                             REFS        67  DEFINED       66
  1320  WQ           COMPLEX     ARRAY                REFS        17       69       80       85       97
                                                   DEFINED        63       67       77       80       96
   474  WRE          REAL                             REFS        67  DEFINED       65
  4420  WW           COMPLEX     ARRAY                REFS        17       99  DEFINED       97
   326  X            REAL        ARRAY    VARBLS      REFS         3
   430  XBO          REAL        ARRAY    BODY        REFS        10
 13266  XO           REAL        ARRAY    VARBLS      REFS         3
  1146  Y            REAL        ARRAY    VARBLS      REFS         3
   454  YBO          REAL        ARRAY    BODY        REFS        10
     0  YIN          REAL        ARRAY     F.P.       REFS        12  DEFINED        1
 13350  YO           REAL        ARRAY    VARBLS      REFS         3
   500  ZBO          REAL        ARRAY    BODY        REFS        10
     0  ZIN          REAL        ARRAY     F.P.       REFS        12  DEFINED        1
 11006  ZV           REAL        ARRAY    VARBLS      REFS         3
  1766  ZZ           REAL        ARRAY    VARBLS      REFS         3
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VARIABLES     SN  TYPE           RELOCATION
  4246   ZZ1        REAL      ARRAY    VARBLS      REFS         3
  6526   ZZ2        REAL      ARRAY    VARBLS      REFS         3
 13432   ZO         REAL      ARRAY    VARBLS      REFS         3
  2606   Z1         REAL      ARRAY    VARBLS      REFS         3
  5066   Z2         REAL      ARRAY    VARBLS      REFS         3
         VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS           TYPE   ARGS       REFERENCES
       AUGW                  11            78

INLINE FUNCTIONS    TYPE   ARGS         DEF LINE  REFERENCES
       CMPLX      COMPLEX    2  INTRIN                67

STATEMENT LABELS               DEF LINE   REFERENCES
    76   51                        52          42
    74   53                        51          46         47         49
   151   187                       68          62         64
     0   200                       70          56
     0   525                       81          79
     0   600                       87          75
   272   700                       90          71
     0   710                       98          95
     0   720                      100          92
   326   770                      101          88

LOOPS   LABEL     INDEX       FROM-TO     LENGTH     PROPERTIES
    66   53        K             46 51        7B       INSTACK
   105   200       J             56 70       57B                   EXT REFS   NOT INNER
   141   187       IW            62 68       12B         OPT
   174   600       J             75 87       70B                   EXT REFS   NOT INNER
   225   525       IX            79 81        4B       INSTACK
   275   720       I             92 100      31B                   EXT REFS   NOT INNER
   302   710       J             95 98       14B                   EXT REFS

COMMON BLOCKS   LENGTH     MEMBERS - BIAS NAME(LENGTH)
       VARBLS     6014                0 NCNSM1  (1)              1 NB       (1)              2 NDELT   (1)
                                      3 NDATA   (1)              4 NOPAN    (1)              5 IQ      (1)
                                      6 IR      (1)              7 JSPECS   (1)              8 NCARAY  (50)
                                     58 NSARAY  (50)           108 NBARAY   (50)           158 ACAP    (1)
                                    159 B2      (1)            160 FL       (1)            161 PI      (1)
                                    162 KR      (1)            163 KRDBR    (1)            164 GMA     (50)
                                    214 X       (400)          614 Y        (400)         1014 ZZ      (400)
                                   1414 Z1      (400)         1814 P1       (400)         2214 ZZ1     (400)
                                   2614 Z2      (400)         3014 P2       (400)         3414 ZZ2     (400)
                                   3814 EV      (400)         4214 PV       (400)         4614 ZV      (400)
                                   5014 SDELX   (400)         5414 DELY     (400)         5814 XO      (50)
                                   5864 YO      (50)          5914 ZO       (50)          5964 GGMA    (50)
       COMA         41                0 LC      (40)            40 CR       (1)
       BODY        340                0 RO      (100)          100 ROP      (100)          200 NBEA    (20)
                                    220 BGMA    (20)           240 MRK      (40)           280 XBO     (20)
                                    300 YBO     (20)           320 ZBO      (20)
       MODE       1720                0 N8      (80)            80 NARQ     (80)           160 LARQ    (240)
                                    400 ARQ     (120)          520 H        (400)          920 DH1     (400)
                                   1320 DH2     (400)
       CTAPES       50                0 ITAPES  (50)
       NTPS         10                0 NTP1    (1)              1 NTP2     (1)              2 NTP3    (1)
                                      3 NTP4    (1)              4 NTP5     (1)              5 NTP6    (1)
```

```
COMMON BLOCKS   LENGTH     MEMBERS - BIAS NAME(LENGTH)
                                     6 NTP7   (1)            7 NTP8   (1)            8 NTP9   (1)
                                     9 NTP10  (1)

STATISTICS
  PROGRAM LENGTH               4555B    2413
  CM LABELED COMMON LENGTH    17757B    8175
          52000B CM USED
```

```
      SUBROUTINE AUGW(NMD,NBOX,NBE,NMTB,N4,N6,NRF,JRF,J ,COEFB,ASUM)       AUGW   2
C                                                                          AUGW   3
      COMMON /VARBLS / NCNSM1,NB,NDELT,NDATA,NOPAN,IQ,IR,JSPECS,           AUGW   4
     1                 NCARAY(50),NSARAY(50),NBARAY(50),ACAP,B2,FL,PI,     AUGW   5
     2                 KR,KRDBR,GMA(50),X(400),Y(400),ZZ(400),Z1(400),     AUGW   6
     3                 P1(400),ZZ1(400),Z2(400),P2(400),ZZ2(400),          AUGW   7
     4                 EV(400),PV(400),ZV(400),SDELX(400),DELY(400),       AUGW   8
     5                 XO(50),YO(50),ZO(50),GGMA(50)                       AUGW   9
      COMMON/NTPS/ NTP1,NTP2,NTP3,NTP4,NTP5,NTP6,NTP7,NTP8,NTP9,NTP10      AUGW  10
      COMMON/BODY/ RO(100), ROP(100), NBEA(20), BGMA(20), MRK(20,2),       AUGW  11
     1             XBO(20), YBO(20), ZBO(20)                               AUGW  12
C                                                                          AUGW  13
      DIMENSION        N8(80) ,      NARQ(80) ,   LARQ(120,2) ,            AUGW  14
     1          COEFB(20),ARQ(120),BB(400),H(400),DH1(400),DH2(400)        AUGW  15
      DIMENSION VBO(30), RVBO(15)                                          AUGW  16
      DIMENSION ITAPES(50)                                                 AUGW  17
C                                                                          AUGW  18
      COMMON  /MODE/ N8,NARQ,LARQ,ARQ,H,DH1,DH2                            AUGW  19
      COMMON /FLUTAN/ FMACH ,BETA  ,VBO   ,RVBO  ,NRVBO                    AUGW  20
      COMMON / CTAPES / ITAPES                                             AUGW  21
      COMMON /COMA/ LC(40), CR                                             AUGW  22
C                                                                          AUGW  23
      COMPLEX AZY(100), DCP(100), WJ(100), WJP(100), ASUM(400), SUM        AUGW  24
      COMPLEX    TRM1, TRM2, TRM3                                          AUGW  25
C                                                                          AUGW  26
      REAL       KR,KRDBR,KKR,KKI                                          AUGW  27
C                                                                          AUGW  28
      ITAPEW = ITAPES(6)                                                   AUGW  29
C                                                                          AUGW  30
      BR     =  FL/2.0                                                     AUGW  31
      S    = B2                                                            AUGW  32
      EPS = 0.001                                                          AUGW  33
      REWIND  NTP8                                                         AUGW  34
      MTAPE  =  ITAPES(40)                                                 AUGW  35
      NBEL = NBEA(NB)                                                      AUGW  36
      READ  (MTAPE)  (BB(II),  II=1,NBEL)                                  AUGW  37
      READ  (MTAPE)  (H(II),   II=1,NBEL)                                  AUGW  38
      READ  (MTAPE)  (DH1(II), II=1,NBEL)                                  AUGW  39
      READ  (MTAPE)  (DH2(II), II=1,NBEL)                                  AUGW  40
      WRITE (ITAPEW,37)  NBE,J                                             AUGW  41
      WRITE (ITAPEW,45)  (BB(KX),  KX=1,NBE)                               AUGW  42
      WRITE (NTP8)  (BB(KX),  KX=1,NBE)                                    AUGW  43
      DO 187  IW=1,NBE                                                     AUGW  44
      WRE      = DH1(IW)                                                   AUGW  45
      WIM      = (H(IW)*KR*S)/BR                                           AUGW  46
      WJ(IW)   = CMPLX(WRE,WIM)                                            AUGW  47
      WREP     = DH2(IW)                                                   AUGW  48
      WIMP     = DH1(IW)*KR/BR                                             AUGW  49
      WJP(IW)  = CMPLX(WREP,WIMP)                                          AUGW  50
      TRM1     = 2.0*ROP(IW)*WJ(IW)                                        AUGW  51
      TRM2     = RO(IW)*WJP(IW)                                            AUGW  52
      TRM3I    = KR*RO(IW)/BR                                              AUGW  53
      TRM3 = (CMPLX(0.0,TRM3I))*WJ(IW)                                     AUGW  54
      DCP(IW) = PI*(TRM1+TRM2+TRM3)                                        AUGW  55
  187 CONTINUE                                                             AUGW  56
      WRITE (ITAPEW,40)  NBE,J                                             AUGW  57
```

```
      WRITE (ITAPEW,50)  NBE,J
      WRITE (ITAPEW,45)  (WJP(KX), KX=1,NBE)
      WRITE (ITAPEW,64)  J
      WRITE (ITAPEW,45)  (DCP(K), K=1,NBE)
      WRITE (NTP7 ) (DCP(K), K=1,NBE)
      NPAN = 1
      DO 600  I=1,NBOX
      SUM     = (0.0,0.0)
      ASUM(I) = (0.0,0.0)
      NBODY= 1
      NFRN = NBEA(NBODY)
      KF   = NBOX
      DO 400  K=1,NBE
      MARK1= MRK(NBODY,1)
      MARK2= MRK(NBODY,2)
      AZY(K) = (0.0,0.0)
      KF = KF + 1
      IF (I.GE.MARK1 .AND. I.LE.MARK2) GO TO 375
      XO   = X(I) - EV(KF)
      YO   =  Y(I)  - PV(KF)
      ZO   = ZZ(I)  - ZV(KF)
      EE   = RO(K)
      E2   = EE*EE
      GAMS = GMA(NPAN)
      GAMSIG = BGMA(NBODY)
      XKER = SDELX(KF)*RO(K)/(2.0*PI)
      XKR = 0.0
      XKI = 0.0
      IGO = 1
      FLAGM = 1.0
  365 CONTINUE
      CALL       TKER  (XO,YO,ZO,KR,BR,GAMS,GAMSIG,FMACH,E2,KKR,KKI)
      XKR = XKR + KKR*FLAGM
      XKI = XKI + KKI*FLAGM
      GO TO (366,367,368,369), IGO
  366 CONTINUE
      IF (NDELT.EQ.0.OR.(ABS(PV(KF))).LE.EPS) GO TO 367
      YO   = Y(I)  + PV(KF)
      GAMSIG = -BGMA(NBODY)
      IGO = 2
      FLAGM= FLOAT(NDELT)
      GO TO 365
  367 CONTINUE
      IF (JSPECS.EQ.0.OR.(ABS(ZV(KF))).LE.EPS) GO TO 369
      YO   = Y(I)  - PV(KF)
      ZO   = ZZ(I) + ZV(KF)
      GAMSIG = -BGMA(NBODY)
      IGO  = 3
      FLAGM= FLOAT(JSPECS)
      GO TO 365
  368 CONTINUE
      IF (NDELT.EQ.0.OR.(ABS(PV(KF))).LE.EPS) GO TO 369
      YO   = Y(I)  + PV(KF)
      GAMSIG =  BGMA(NBODY)
      IGO  = 4
      FLAGM= FLOAT(NDELT)*FLOAT(JSPECS)
      GO TO 365
```

```
      369 CONTINUE                                                          AUGW     116
          XKR = XKR *XKER                                                   AUGW     117
          XKI = XKI *XKER                                                   AUGW     118
          AZY(K) = CMPLX(XKR , XKI)                                         AUGW     119
      375 CONTINUE                                                          AUGW     120
          SUM  = SUM + AZY(K)*DCP(K)                                        AUGW     121
          IF (K.NE.NFRN)  GO TO 400                                         AUGW     122
          NBODY= NBODY+1                                                    AUGW     123
          NFRN = NBEA(NBODY)                                                AUGW     124
      400 CONTINUE                                                          AUGW     125
          ASUM(I) = SUM                                                     AUGW     126
          IF (N4.EQ.0)  GO TO 405                                           AUGW     127
          WRITE (ITAPEW,66)  I,NBE                                          AUGW     128
          WRITE (ITAPEW,45)  (AZY(K), K=1,NBE)                              AUGW     129
      405 CONTINUE                                                          AUGW     130
          IF (I.EQ.NBARAY(NPAN))  NPAN=NPAN+1                               AUGW     131
      600 CONTINUE                                                          AUGW     132
          WRITE (ITAPEW,68)   J                                             AUGW     133
          WRITE (ITAPEW,45)  (ASUM(I),  I=1,NBOX)                           AUGW     134
    C                                                                       AUGW     135
    C                                                                       AUGW     136
    C FORMATS                                                               AUGW     137
    C                                                                       AUGW     138
       37 FORMAT  (1H0,25X,3HTHE,I4,31H B-MATRIX ELEMENTS FOR MODE NO.,I4)  AUGW     139
       40 FORMAT  (1H0,25X,3HTHE,I4,32H WJ MATRIX ELEMENTS FOR MODE NO.,I4) AUGW     140
       45 FORMAT  (1H0,6E17.8)                                              AUGW     141
       50 FORMAT  (1H0,25X,3HTHE,I4,31H WJ-PRIME ELEMENTS FOR MODE NO.,I4)  AUGW     142
       64 FORMAT  (1H0, 8HCOL. NO.,I4,18H  OF DEL-CP MATRIX//)              AUGW     143
       66 FORMAT  (1H0,10X,7HROW NO.,I4,7H OF THE,I4,17H APZ-APY ELEMENTS')  AUGW     144
       68 FORMAT  (1H0,10X,10HCOLUMN NO.,I4,19H OF THE AUGW MATRIX//)       AUGW     145
    C                                                                       AUGW     146
          RETURN                                                            AUGW     147
          END                                                               AUGW     148
```

SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS		DEF LINE	REFERENCES
3	AUGW	1	146

VARIABLES		SN	TYPE		RELOCATION							
236	ACAP		REAL		VARBLS	REFS	3					
620	ARQ		REAL	ARRAY	MODE	REFS	13	18				
0	ASUM		COMPLEX	ARRAY	F.P.	REFS	23	133	DEFINED	1	66	125
1503	AZY		COMPLEX	ARRAY		REFS	23	120	128	DEFINED	73	118
663	BB		REAL	ARRAY		REFS	13	41	42	DEFINED	36	
1	BETA		REAL		FLUTAN	REFS	19					
334	BGMA		REAL	ARRAY	BODY	REFS	10	82	96	104	111	
622	BR		REAL			REFS	45	48	52	89	DEFINED	30
237	B2		REAL		VARBLS	REFS	3	31				
0	COEFB		REAL	ARRAY	F.P.	REFS	13	DEFINED	1			
50	CR		REAL		COMA	REFS	21					
2013	DCP		COMPLEX	ARRAY		REFS	23	61	62	120	DEFINED	54
12446	DELY		REAL	ARRAY	VARBLS	REFS	3					

```
VARIABLES       SN  TYPE          RELOCATION
 1630  DH1          REAL        ARRAY   MODE        REFS       13      18      44      48  DEFINED     38
 2450  DH2          REAL        ARRAY   MODE        REFS       13      18      47  DEFINED     39
  652  EE           REAL                            REFS     2*80  DEFINED     79
  624  EPS          REAL                            REFS       94     101     109  DEFINED     32
 7346  EV           REAL        ARRAY   VARBLS      REFS        3      76
  653  E2           REAL                            REFS       89  DEFINED     80
  240  FL           REAL                VARBLS      REFS        3      30
  662  FLAGM        REAL                            REFS       90      91  DEFINED     87      98     106     113
    0  FMACH        REAL                FLUTAN      REFS       19      89
  654  GAMS         REAL                            REFS       89  DEFINED     81
  655  GAMSIG       REAL                            REFS       89  DEFINED     82      96     104     111
13514  GGMA         REAL        ARRAY   VARBLS      REFS        3
  244  GMA          REAL        ARRAY   VARBLS      REFS        3      81
 1010  H            REAL        ARRAY   MODE        REFS       13      18      45  DEFINED     37
  641  I            INTEGER                         REFS       66    2*75      76      77      78      95     102
                                                     103      110     125     127     130     133
                                                 DEFINED       64     133
  661  IGO          INTEGER                         REFS       92  DEFINED     86      97     105     112
  627  II           INTEGER                         REFS       36      37      38      39  DEFINED     36      37
                                                      38       39
    5  IQ           INTEGER             VARBLS      REFS        3
    6  IR           INTEGER             VARBLS      REFS        3
    0  ITAPES       INTEGER     ARRAY   CTAPES      REFS       16      20      28      34
  621  ITAPEW       INTEGER                      DEFINED       28  I/O REFS    40      41      56      57      58
                                                      59       60      61     127     128     132     133
  631  IW           INTEGER                         REFS       44      45      46      47      48      49    2*50
                                                    2*51       52      53      54  DEFINED     43
    0  J            INTEGER              F.P.       REFS       40      56      58      60     132
                                                 DEFINED        1
    0  JRF          INTEGER    *UNUSED   F.P.    DEFINED        1
    7  JSPECS       INTEGER             VARBLS      REFS        3     101     106     113
  637  K            INTEGER                         REFS       61      62      73      79      83     118   2*120
                                                     121      128  DEFINED     61      62      70     128
  644  KF           INTEGER                         REFS       74      76      77      78      83      94      95
                                                     101      102     103     109     110  DEFINED     69      74
  620  KKI          REAL                            REFS       26      89      91
  617  KKR          REAL                            REFS       26      89      90
  242  KR           REAL                VARBLS      REFS        3      26      45      48      52      89
  243  KRDBR        REAL                VARBLS      REFS        3      26
  630  KX           INTEGER                         REFS       41      42      57      59  DEFINED     41      42
                                                      57       59
  240  LARQ         INTEGER     ARRAY   MODE        REFS       13      18
    0  LC           INTEGER     ARRAY   COMA        REFS       21
  645  MARK1        INTEGER                         REFS       75  DEFINED     71
  646  MARK2        INTEGER                         REFS       75  DEFINED     72
  360  MRK          INTEGER     ARRAY   BODY        REFS       10      71      72
  625  MTAPE        INTEGER                      DEFINED       34  I/O REFS    36      37      38      39
  120  NARQ         INTEGER     ARRAY   MODE        REFS       13      18
    1  NB           INTEGER             VARBLS      REFS        3      35
  154  NBARAY       INTEGER     ARRAY   VARBLS      REFS        3     130
    0  NBE          INTEGER              F.P.       REFS       40      41      42      43      56      57      58
                                                      59       61      62      70     127     128
                                                 DEFINED        1
  310  NBEA         INTEGER     ARRAY   BODY        REFS       10      35      68     123
  626  NBEL         INTEGER                         REFS       36      37      38      39  DEFINED     35
  642  NBODY        INTEGER                         REFS       68      71      72      82      96     104     111
                                                     122      123  DEFINED     67     122
```

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      SUBROUTINE AUGW       74/74    OPT=1                          FTN 4.8+577        85/01/23. 08.10.44       PAGE     5

VARIABLES     SN  TYPE            RELOCATION
    0  NBOX       INTEGER                F.P          REFS       64        69        133    DEFINED        1
   10  NCARAY     INTEGER      ARRAY    VARBLS        REFS        3
    0  NCNSM1     INTEGER               VARBLS        REFS        3
    3  NDATA      INTEGER               VARBLS        REFS        3
    2  NDELT      INTEGER               VARBLS        REFS        3        94         98       109        113
  643  NFRN       INTEGER                             REFS      121   DEFINED         68       123
    0  NMD        INTEGER     *UNUSED    F.P.      DEFINED        1
    0  NMTB       INTEGER     *UNUSED    F.P.      DEFINED        1
    4  NOPAN      INTEGER               VARBLS        REFS        3
  640  NPAN       INTEGER                             REFS       81     2*130    DEFINED        63        130
    0  NRF        INTEGER     *UNUSED    F.P.      DEFINED        1
   57  NRVBO      INTEGER               FLUTAN        REFS       19
   72  NSARAY     INTEGER      ARRAY    VARBLS        REFS        3
    0  NTP1       INTEGER               NTPS          REFS        9
   11  NTP10      INTEGER               NTPS          REFS        9
    1  NTP2       INTEGER               NTPS          REFS        9
    2  NTP3       INTEGER               NTPS          REFS        9
    3  NTP4       INTEGER               NTPS          REFS        9
    4  NTP5       INTEGER               NTPS          REFS        9
    5  NTP6       INTEGER               NTPS          REFS        9
    6  NTP7       INTEGER               NTPS          REFS        9   I/O REFS        62
    7  NTP8       INTEGER               NTPS          REFS        9   I/O REFS        33        42
   10  NTP9       INTEGER               NTPS          REFS        9
    0  N4         INTEGER                F.P.         REFS      126   DEFINED          1
    0  N6         INTEGER     *UNUSED    F.P.      DEFINED        1
    0  N8         INTEGER      ARRAY    MODE          REFS       13        18
  241  PI         REAL                  VARBLS        REFS        3        54         83
10166  PV         REAL         ARRAY    VARBLS        REFS        3        77         94        95        102        109        110
 3426  P1         REAL         ARRAY    VARBLS        REFS        3
 5706  P2         REAL         ARRAY    VARBLS        REFS        3
   40  RVBO       REAL         ARRAY    FLUTAN        REFS       15        19
    0  RO         REAL         ARRAY    BODY          REFS       10        51         52        79         83
  144  ROP        REAL         ARRAY    BODY          REFS       10        50
  623  S          REAL                                REFS       45   DEFINED         31
11626  SDELX      REAL         ARRAY    VARBLS        REFS        3        83
  607  SUM        COMPLEX                             REFS       23       120        125    DEFINED        65        120
  611  TRM1       COMPLEX                             REFS       24        54    DEFINED        50
  613  TRM2       COMPLEX                             REFS       24        54    DEFINED        51
  615  TRM3       COMPLEX                             REFS       24        54    DEFINED        53
  636  TRM3I      REAL                                REFS       53   DEFINED         52
    2  VBO        REAL         ARRAY    FLUTAN        REFS       15        19
  633  WIM        REAL                                REFS       46   DEFINED         45
  635  WIMP       REAL                                REFS       49   DEFINED         48
 2323  WJ         COMPLEX      ARRAY                  REFS       23        50         53        57    DEFINED         46
 2633  WJP        COMPLEX      ARRAY                  REFS       23        51         59    DEFINED        49
  632  WRE        REAL                                REFS       46   DEFINED         44
  634  WREP       REAL                                REFS       49   DEFINED         47
  326  X          REAL         ARRAY    VARBLS        REFS        3        76
  430  XBO        REAL         ARRAY    BODY          REFS       10
  656  XKER       REAL                                REFS      116       117    DEFINED        83
  660  XKI        REAL                                REFS       91       117        118    DEFINED        85         91        117
  657  XKR        REAL                                REFS       90       116        118    DEFINED        84         90        116
13266  XO         REAL         ARRAY    VARBLS        REFS        3
  647  XO         REAL                                REFS       89   DEFINED         76
 1146  Y          REAL         ARRAY    VARBLS        REFS        3        77         95       102        110
  454  YBO        REAL         ARRAY    BODY          REFS       10
13350  YO         REAL         ARRAY    VARBLS        REFS        3
```

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VARIABLES     SN  TYPE           RELOCATION
  650  YO         REAL                             REFS        89   DEFINED       77        95       102       110
  500  ZBO        REAL       ARRAY     BODY        REFS        10
13432  ZO         REAL       ARRAY     VARBLS      REFS         3
11006  ZV         REAL       ARRAY     VARBLS      REFS         3       78       101       103
 1766  ZZ         REAL       ARRAY     VARBLS      REFS         3       78       103
 4246  ZZ1        REAL       ARRAY     VARBLS      REFS         3
 6526  ZZ2        REAL       ARRAY     VARBLS      REFS         3
  651  ZO         REAL                             REFS        89   DEFINED       78       103
 2606  Z1         REAL       ARRAY     VARBLS      REFS         3
 5066  Z2         REAL       ARRAY     VARBLS      REFS         3
       VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS          TYPE   ARGS        REFERENCES
       TKER                11                89

INLINE FUNCTIONS   TYPE   ARGS        DEF LINE  REFERENCES
       ABS        REAL       1  INTRIN                 94       101       109
       CMPLX      COMPLEX    2  INTRIN                 46        49        53       118
       FLOAT      REAL       1  INTRIN                 98       106     2*113

STATEMENT LABELS             DEF LINE    REFERENCES
  530  37       FMT             138          40
  537  40       FMT             139          56
  546  45       FMT             140          41        57        59        61       128       133
  551  50       FMT             141          58
  560  64       FMT             142          60
  566  66       FMT             143         127
  575  68       FMT             144         132
    0  187                       55          43
  231  365                       88          99       107       114
  250  366                       93          92
  264  367                      100          92        94
  302  368                      108          92
  320  369                      115          92       101       109
  325  375                      119          75
  342  400                      124          70       121
  360  405                      129         126
    0  600                      131          64

LOOPS  LABEL    INDEX     FROM-TO     LENGTH    PROPERTIES
   73  187      IW         43 55        32B        OPT
  165  600      I          64 131      202B               EXT REFS  NOT INNER
  175  400      K          70 124      150B               EXT REFS

COMMON BLOCKS   LENGTH    MEMBERS - BIAS NAME(LENGTH)
       VARBLS     6014              0 NCNSM1 (1)            1 NB      (1)            2 NDELT  (1)
                                    3 NDATA  (1)            4 NOPAN   (1)            5 IQ     (1)
                                    6 IR     (1)            7 JSPECS  (1)            8 NCARAY (50)
                                   58 NSARAY (50)         108 NBARAY  (50)         158 ACAP   (1)
                                  159 B2     (1)          160 FL      (1)          161 PI     (1)
                                  162 KR     (1)          163 KRDBR   (1)          164 GMA    (50)
                                  214 X      (400)        614 Y       (400)       1014 ZZ     (400)
                                 1414 Z1     (400)       1814 P1      (400)       2214 ZZ1    (400)
                                 2614 Z2     (400)       3014 P2      (400)       3414 ZZ2    (400)
                                 3814 EV     (400)       4214 PV      (400)       4614 ZV     (400)
                                 5014 SDELX  (400)       5414 DELY    (400)       5814 XO     (50)
                                 5864 YO     (50)        5914 ZO      (50)        5964 GGMA   (50)
```

```
COMMON BLOCKS   LENGTH   MEMBERS - BIAS NAME(LENGTH)
       NTPS         10             0 NTP1    (1)              1 NTP2    (1)              2 NTP3    (1)
                                   3 NTP4    (1)              4 NTP5    (1)              5 NTP6    (1)
                                   6 NIP7    (1)              7 NTP8    (1)              8 NTP9    (1)
                                   9 NTP10   (1)
       BODY        340             0 RO      (100)          100 ROP     (100)          200 NBEA    (20)
                                 220 BGMA    (20)           240 MRK     (40)           280 XBO     (20)
                                 300 YBO     (20)           320 ZBO     (20)
       MODE       1720             0 N8      (80)            80 NARQ    (80)           160 LARQ    (240)
                                 400 ARQ     (120)          520 H       (400)          920 DH1     (400)
                                1320 DH2     (400)
       FLUTAN       48             0 FMACH   (1)              1 BETA    (1)              2 VBO     (30)
                                  32 RVBO    (15)            47 NRVBO   (1)
       CTAPES       50             0 ITAPES  (50)
       COMA         41             0 LC      (40)            40 CR      (1)

STATISTICS
  PROGRAM LENGTH                 3153F     1643
  CM LABELED COMMON LENGTH      20037B     8223
         52000B CM USED
```

```
      SUBROUTINE TKER  (XO,YO,ZO,KR,BR,GAMS GAMSIG,FMACH,E2,KKR,KKI)      TKER       2
      REAL    M, KR  KKR, KKI, IOOR, IOOI, JOOR, JOOI  I1OR, I1OI, I2OR3,  TKER       3
     1        I2OI3, IOUR, IOUI, JOUR, JOUI, I1UR, I1UI, I2UR3, I2UI3,     TKER       4
     2        K1, MU1, MU, K2                                              TKER       5
      REAL    K1O,K2O,K1RT1,K1IT1,K2RT2P,K2IT2P,K1OT1,K2OT2P               TKER       6
      L     = 0                                                            TKER       7
      EPS   = 0 00001                                                      TKER       8
      M     = FMACH                                                        TKER       9
      R1= SQRT (YO*YO+ZO*ZO)                                               TKER      10
      R1S = R1                                                             TKER      11
      RTWO    = R1*R1                                                      TKER      12
      RFOUR   = RTWO*RTWO                                                  TKER      13
      K1O     = O O                                                        TKER      14
      K2O     = O.O                                                        TKER      15
      K1RT1   = O.O                                                        TKER      16
      K1IT1   = O.O                                                        TKER      17
      K2RT2P  = O.O                                                        TKER      18
      K2IT2P  = O.O                                                        TKER      19
      K1OT1   = O O                                                        TKER      20
      K2OT2P  = O O                                                        TKER      21
      IF  ( R1 )               200,100.200                                 TKER      22
  100 IF  ( XO )               110,120,120                                 TKER      23
  110 KKR=O.                                                               TKER      24
      KKI=O.                                                               TKER      25
      GO TO  907                                                           TKER      26
  120 C1= KR*XO/BR                                                         TKER      27
      T1= COS(GAMS-GAMSIG)                                                 TKER      28
      K1O     = 2.0                                                        TKER      29
      K1RT1   = 2 O*T1*COS(C1)                                             TKER      30
      K1IT1   =-2 O*T1*SIN(C1)                                             TKER      31
      K1OT1   = 2.O*T1                                                     TKER      32
      GO TO  905                                                           TKER      33
  200 C1=COS(GAMS)                                                         TKER      34
      C2=SIN(GAMS)                                                         TKER      35
      C3=COS(GAMSIG)                                                       TKER      36
      C4=SIN(GAMSIG)                                                       TKER      37
      T2P=(ZO*ZO*C1*C3+YO*YO*C2*C4-ZO*YO*(C2*C3+C1*C4))                    TKER      38
      T2 = T2P/E2                                                          TKER      39
      IF  ( ABS(T2)-EPS )               210,220,220                        TKER      40
  210 ICHUZ=1                                                              TKER      41
      T1= COS(GAMS-GAMSIG)                                                 TKER      42
      T2=O.                                                                TKER      43
      GO TO 300                                                            TKER      44
  220 T1= COS(GAMS-GAMSIG)                                                 TKER      45
      IF  ( ABS(T1)-EPS )               230,240,240                        TKER      46
  230 ICHUZ=2                                                              TKER      47
      T1=O.                                                                TKER      48
      GO TO 300                                                            TKER      49
  240 ICHUZ=3                                                              TKER      50
  300 BETA2 = (1.-M*M)                                                     TKER      51
      BIGR = SQRT (XO*XO+BETA2*R1*R1)                                      TKER      52
      K1= KR*R1/BR                                                         TKER      53
      MU1= (M*BIGR-XO)/ (BETA2*R1)                                         TKER      54
      MU=ABS(MU1)                                                          TKER      55
      K2=K1*K1                                                             TKER      56
      IF  ( MU1 )              310,320,330                                 TKER      57
```

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VARIABLES      SN  TYPE          RELOCATION
  3426  P1          REAL      ARRAY    VARBLS     REFS        6      62      74     146
  5706  P2          REAL      ARRAY    VARBLS     REFS        6      63      74     145
    40  RVBO        REAL      ARRAY    FLUTAN     REFS       13      17
   627  SAVE1       REAL                          REFS      110     134     184  DEFINED     95    110
   630  SAVE2       REAL                          REFS      165     184 DEFINED      96    134    165
   640  SAX2        REAL                          REFS      149 DEFINED     147
   624  SDELI       REAL                          REFS      104     133     183  DEFINED     92    104
   623  SDELR       REAL                          REFS      103     132     182  DEFINED     91    103
 11626  SDELX       REAL      ARRAY    VARBLS     REFS        6      59     101     156
   557  SGR         REAL                          REFS      109     113     164     168 DEFINED     32    192
   565  SGS         REAL                          REFS      109     113     118     164    168
                                               DEFINED       44     118     151     174    191
   617  SL          REAL                          REFS      109     113     139     164    168
                                               DEFINED       78      86     139
   552  SMALL       REAL                          REFS       70      73     100     155 DEFINED     25
   616  SQTL        REAL                          REFS       78      79 DEFINED      77     84
   622  SSDELI      REAL                          REFS      159     183 DEFINED      90    133    159
   621  SSDELR      REAL                          REFS      158     182 DEFINED      89    132    158
   614  TL          REAL                          REFS       77      78     109     113    140    164    168
                                               DEFINED       74      81      83     140
     2  VBO         REAL      ARRAY    FLUTAN     REFS       13      17
   612  WEIRD       REAL                          REFS       72 DEFINED      71
   326  X           REAL      ARRAY    VARBLS     REFS        6      64      65      66
 13266  XO          REAL      ARRAY    VARBLS     REFS        6
   637  XPRIME      REAL                       DEFINED      112     167
   633  XO          REAL                          REFS      105     113     164     168 DEFINED    106    161
  1146  Y           REAL      ARRAY    VARBLS     REFS        6      61      62      63    144    145    146
 13350  YO          REAL      ARRAY    VARBLS     REFS        6
   634  YO          REAL                          REFS      109     113     164     168 DEFINED    107    162
 13432  ZO          REAL      ARRAY    VARBLS     REFS        6
 11006  ZV          REAL      ARRAY    VARBLS     REFS        6      67     119     141    175
  1766  ZZ          REAL      ARRAY    VARBLS     REFS        6      67      68      69    119    120    121
                                                   141      142     143     175     176    177
  4246  ZZ1         REAL      ARRAY    VARBLS     REFS        6      68      81     120    143    177
  6526  ZZ2         REAL      ARRAY    VARBLS     REFS        6      69      81     121    142    176
   635  ZO          REAL                          REFS      109     113     164     168 DEFINED    108    163
  2606  Z1          REAL      ARRAY    VARBLS     REFS        6      65      71      74     81
  5066  Z2          REAL      ARRAY    VARBLS     REFS        6      66      71      74     81
        VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS          TYPE   ARGS       REFERENCES
        COS        REAL     1 LIBRARY     33       45
        INCRO              26            101      156
        SIN        REAL     1 LIBRARY     32       44     151     174     191     192
        SNPDF              14            109      113     164     168
        SQRT       REAL     1 LIBRARY     77

INLINE FUNCTIONS   TYPE   ARGS      DEF LINE   REFERENCES
        ABS        REAL     1  INTRIN               46       72
        FLOAT      REAL     1  INTRIN              103      104     110     114     158    159    165    169

STATEMENT LABELS             DEF LINF   REFERENCES
   531  10       FMT            207        199
   541  30       FMT            209        200
    16  90                       30         36
    31  100                      37         35
    31  110                      42         57
```

```
VARIABLES       SN  TYPE            RELOCATION
                                              130       141       142       143       144       145       146       167
                                              175       176       177       199   DEFINED        28
     6  IR         INTEGER           VARBLS   REFS        6        55        59        61        62        63        64
                                               65        66        67        68        69      2*71      4*74        76
                                             4*81        87       101       112       119       120       121       141
                                              142       143       144       145       146       156       167       175
                                              176       177       185       186       187       188       193
                                          DEFINED        39       188
     0  ITAPES     INTEGER  ARRAY    CTAPES   REFS       15        19        22
   550  ITAPEW     INTEGER                    DEFINED    22   I/O REFS      199       200
   600  JSPEC      INTEGER                    REFS      116       122       171       172   DEFINED        60       123
                                              138       178
     7  JSPECS     INTEGER           VARBLS   REFS        6        60       124       138       179
   242  KR         REAL              VARBLS   REFS        4         6       101       156
   243  KRDBR      REAL              VARBLS   REFS        4         6       100       155
     3  K1IT1      REAL              DLM      REFS        3        12
     2  K1RT1      REAL              DLM      REFS        3        12
     0  K1O        REAL              DLM      REFS        3        12
     6  K1OT1      REAL              DLM      REFS        3        12
     5  K2IT2P     REAL              DLM      REFS        3        12
     4  K2RT2P     REAL              DLM      REFS        3        12
     1  K2O        REAL              DLM      REFS        3        12
     7  K2OT2P     REAL              DLM      REFS        3        12
   632  LHS        INTEGER                    REFS      101       156   DEFINED        99       154
   574  MULT       INTEGER                    REFS      103       104       110       114       158       159       165
                                              169   DEFINED        52       124       152       179
     1  NB         INTEGER           VARBLS   REFS        6        50   DEFINED        40        56
   154  NBARAY     INTEGER  ARRAY    VARBLS   REFS        6        34        49
     0  NBV        INTEGER           F.P.     REFS      101       130       156   DEFINED         1
   561  NBXR       INTEGER                    REFS       35   DEFINED        34
   572  NBXS       INTEGER                    REFS       55        56       101       156   DEFINED        49
    10  NCARAY     INTEGER  ARRAY    VARBLS   REFS        6        48
   571  NCM1       INTEGER                    REFS       50       195   DEFINED        48
     0  NCNSM1     INTEGER           VARBLS   REFS        6        28       193       199       200       201
   573  NCPNB      INTEGER                    REFS      101       156   DEFINED        50
     3  NDATA      INTEGER           VARBLS   REFS        6       198
   631  NDBLE      INTEGER                    REFS      101       156   DEFINED        97       122       127       172
     2  NDELT      INTEGER           VARBLS   REFS        6        24       128       131
   554  NDRAG      INTEGER                    REFS      111       166   DEFINED        27
   553  NFF        INTEGER                    REFS      101       156   DEFINED        26
     4  NOPAN      INTEGER           VARBLS   REFS        6
   570  NPS        INTEGER                    REFS       48        49   DEFINED        47
    57  NRVBO      INTEGER           FLUTAN   REFS       13
    72  NSARAY     INTEGER  ARRAY    VARBLS   REFS        6
     0  NTP1       INTEGER           NTPS     REFS       14   I/O REFS      201
    11  NTP10      INTEGER           NTPS     REFS       14
     1  NTP2       INTEGER           NTPS     REFS       14
     2  NTP3       INTEGER           NTPS     REFS       14
     3  NTP4       INTEGER           NTPS     REFS       14
     4  NTP5       INTEGER           NTPS     REFS       14
     5  NTP6       INTEGER           NTPS     REFS       14
     6  NTP7       INTEGER           NTPS     REFS       14
     7  NTP8       INTEGER           NTPS     REFS       14
    10  NTP9       INTEGER           NTPS     REFS       14
     0  NYAW       INTEGER           F.P.     REFS      129   DEFINED         1
   241  PI         REAL              VARBLS   REFS        6
 10166  PV         REAL     ARRAY    VARBLS   REFS        6        61       144
```

```
ENTRY POINTS      DEF LINE      REFERENCES
    3  PRT2            1          211

VARIABLES      SN  TYPE                RELOCATION
  236  ACAP        REAL                 VARBLS      REFS         6
  567  ACGS        REAL                             REFS        70    DEFINED        46
  613  AWEIRD      REAL                             REFS        73    DEFINED        72
  642  AWW         REAL        ARRAY                REFS        18        200       201    DEFINED       185
 1462  AWWI        REAL        ARRAY                REFS        18        200       201    DEFINED       186
  604  AX          REAL                             REFS       101        106       156        161    DEFINED        64
  605  AX1         REAL                             REFS       101        148       156    DEFINED        65       149
  606  AX2         REAL                             REFS       101        147       156    DEFINED        66       148
  601  AY          REAL                             REFS       101        107       156        162    DEFINED        61       144
  602  AY1         REAL                             REFS       101        156    DEFINED         62       145
  603  AY2         REAL                             REFS       101        156    DEFINED         63       146
  607  AZ          REAL                             REFS       101        108       156        163    DEFINED        67       119
                                                     141       175
  610  AZ1         REAL                             REFS       101        156    DEFINED         68       120       142       176
  611  AZ2         REAL                             REFS       101        156    DEFINED         69       121       143       177
    1  BETA        REAL                 FLUTAN      REFS        13         74        81        101       109       113       156
                                                     164       168
  237  B2          REAL                 VARBLS      REFS         6
  560  CGR         REAL                             REFS       109        113       164        168    DEFINED        33
  566  CGS         REAL                             REFS        46         74       109        113       164       168
                                                 DEFINED        45
  620  CL          REAL                             REFS       109        113       164        168    DEFINED        79        85
  577  CV          REAL                             REFS       109        113       164        168    DEFINED        59
  626  DELI        REAL                             REFS       101        104       156        159       186
                                                 DEFINED        94        183
  625  DELR        REAL                             REFS       101        103       156        158       185
                                                 DEFINED        93        182
12446  DELY        REAL        ARRAY    VARBLS      REFS         6         76        87        101       156
  636  DIJ         REAL                             REFS       109        110       113        114       164       165       168
                                                     169       185    DEFINED       184
  576  DL          REAL                             REFS       169        187    DEFINED         54       135       169
 2302  DPRIME      REAL        ARRAY                REFS        20    DEFINED       187
  575  DR          REAL                             REFS       114        135       187    DEFINED        53       114
  615  EE          REAL                             REFS       109        113       164        168    DEFINED        76        87
 7346  EV          REAL        ARRAY    VARBLS      REFS         6         64     2*112      2*167
   10  E2          REAL                 DLM         REFS        12
  551  FDELT       REAL                             REFS       182        183       184        187    DEFINED        24
  240  FL          REAL                 VARBLS      REFS         6        101       156
    0  FMACH       REAL                 FLUTAN      REFS        13
  556  GAMS        REAL                             REFS        32         33       101        156       192
                                                 DEFINED        31        190
  564  GAMSIG      REAL                             REFS        44         45       101        117       151       156       174
                                                     191   DEFINED         43       117        150       173       189
13514  GGMA        REAL        ARRAY    VARBLS      REFS         6
  244  GMA         REAL        ARRAY    VARBLS      REFS         6         31        43        150       173       189       190
  641  I           INTEGER                          REFS     2*200      2*201    DEFINED        200       201
  562  IG          INTEGER                          REFS        42         43        47        150       173       189
                                                 DEFINED        38         42
  555  IH          INTEGER                          REFS        30         31        34        190    DEFINED        29        30
  563  IO          INTEGER                          REFS       101        156       194        195    DEFINED        41       194
                                                     195
    5  IQ          INTEGER              VARBLS      REFS         6         35        61         62        63        64        65
                                                      66        67        68         69       112       119       120       121
```

```
      NDBLE = JSPEC
      GAMSIG =  GMA(IG)
      SGS    = SIN(GAMSIG)
      AZ   = ZZ(IQ) + ZV(IR)
      AZ1  = ZZ(IQ) +ZZ2(IR)
      AZ2  = ZZ(IQ) +ZZ1(IR)
      JSPEC = 0
      MULT = JSPECS
      GO TO 310
  350 CONTINUE
      DELR  = SDELR + SSDELR*FDELT
      DELI  = SDELI + SSDELI*FDELT
      DIJ   = SAVE1 + SAVE2 *FDELT
      AWW(IR) = DIJ - DELR
      AWWI(IR)=-DELI
      DPRIME(IR) = DR + DL*FDELT
      IR = IR + 1
      GAMSIG = GMA(IG)
      GAMS  = GMA(IH)
      SGS    = SIN(GAMSIG)
      SGR    = SIN(GAMS)
      IF(IR.GT.NCNSM1) GO TO 360
      IO = IO + 1
      IF (IO.GT.NCM1) IO = 1
      GO TO  120
  360 CONTINUE
      IF (NDATA .EQ. 0) GO TO 380
      WRITE (ITAPEW,10) IQ,NCNSM1
      WRITE (ITAPEW,30)  (AWW(I),AWWI(I),  I=1,NCNSM1)
  380 WRITE (NTP1)  (AWW(I),AWWI(I),  I=1,NCNSM1)
  390 CONTINUE
C
C
C FORMATS
C
   10 FORMAT (1HO,15HAWW PART OF ROW,I5,2X, 4HWITH,I5,2X,27HELEMENTS IS
     1NOW PRINTED OUT)
   30 FORMAT (1HO,6E20.8)
C
      RETURN
      END
```

CARD NR. SEVERITY DETAILS DIAGNOSIS OF PROBLEM

CARD NR.	SEVERITY	DETAILS	DIAGNOSIS OF PROBLEM
28	I		CONTROL VARIABLE IN COMMON OR EQUIVALENCED. OPTIMIZATION MAY BE INHIBITED.

SYMBOLIC REFERENCE MAP (R=3)

```
  250 CONTINUE
      IF (JSPEC.EQ.O)  GO TO  270
      GAMSIG = -GAMSIG
      SGS    =-SGS
      AZ  = ZZ(IQ) + ZV(IR)
      AZ1 = ZZ(IQ) +ZZ1(IR)
      AZ2 = ZZ(IQ) +ZZ2(IR)
      NDBLE = JSPEC
      JSPEC = O
      MULT = JSPECS
      GO TO 230
  270 CONTINUE
      NDBLE = O
      IF (NDELT.EQ.O)  GO TO 350
      IF (NYAW.EQ.O)  GO TO 280
      IF (IQ.GT.NBV)  GO TO 280
      IF (NDELT.EQ.1)  GO TO 350
      SSDELR = -SDELR
      SSDELI = -SDELI
      SAVE2  = -SAVE1
      DL = -DR
      GO TO  350
  280 CONTINUE
      JSPEC  = JSPECS
      SL    = -SL
      TL    = -TL
      AZ    = ZZ(IQ) - ZV(IR)
      AZ1   = ZZ(IQ) -ZZ2(IR)
      AZ2   = ZZ(IQ) -ZZ1(IR)
      AY    =  Y(IQ) + PV(IR)
      AY1   =  Y(IQ) + P2(IR)
      AY2   =  Y(IQ) + P1(IR)
      SAX2 = AX2
      AX2  = AX1
      AX1  =SAX2
      GAMSIG = -GMA(IG)
      SGS    = SIN(GAMSIG)
      MULT = 1
  310 CONTINUE
      LHS = 1
      IF (KRDBR.LE.SMALL) GO TO 320
      CALL       INCRO(AX,AY,AZ,AX1,AY1,AZ1,AX2,AY2,AZ2,GAMS,GAMSIG,LHS,
     1IR, NFF ,IO,NBXS,NCPNB,NDBLE,NBV,DELR,DELI,FL,BETA,SDELX,DELY,KR)
      SSDELR =SSDELR + DELR*(FLOAT(MULT))
      SSDELI =SSDELI + DELI*(FLOAT(MULT))
  320 CONTINUE
      XO = AX
      YO = AY
      ZO = AZ
      CALL       SNPDF(SL,CL,TL,SGS,CGS,SGR,CGR,XO,YO,ZO,EE,DIJ,BETA,CV)
      SAVE2  = SAVE2 + DIJ *(FLOAT(MULT))
      IF (NDRAG.EQ.O)  GO TO  330
      XPRIME = EV(IQ) - EV(IR)
      CALL       SNPDF(SL,CL,TL,SGS,CGS,SGR,CGR,XO,YO,ZO,EE,DIJ,BETA,CV)
      DL     = DL    + DIJ *(FLOAT(MULT))
  330 CONTINUE
      IF (JSPEC.EQ.O)  GO TO  350
```

```
  130 CONTINUE                                                              PRT2   59
      CV    = SDELX(IR)                                                     PRT2   60
      JSPEC  = JSPECS                                                       PRT2   61
      AY   =  Y(IQ) - PV(IR)                                                PRT2   62
      AY1 =  Y(IQ) - P1(IR)                                                 PRT2   63
      AY2 =  Y(IQ) - P2(IR)                                                 PRT2   64
      AX   =  X(IQ) - EV(IR)                                                PRT2   65
      AX1 =  X(IQ) - Z1(IR)                                                 PRT2   66
      AX2 =  X(IQ) - Z2(IR)                                                 PRT2   67
      AZ   = ZZ(IQ) - ZV(IR)                                                PRT2   68
      AZ1 = ZZ(IQ) -ZZ1(IR)                                                 PRT2   69
      AZ2 = ZZ(IQ) -ZZ2(IR)                                                 PRT2   70
      IF (ACGS.LE.SMALL) GO TO 190                                          PRT2   71
      WEIRD = Z2(IR) -Z1(IR)                                                PRT2   72
      AWEIRD = ABS(WEIRD)                                                   PRT2   73
      IF (AWEIRD.LT.SMALL) GO TO 200                                        PRT2   74
      TL =    (((Z2(IR)-Z1(IR))/(P2(IR)-P1(IR)))*CGS)/BETA                  PRT2   75
  180 CONTINUE                                                              PRT2   76
      EE =  DELY(IR)/2.                                                     PRT2   77
      SQTL = SQRT(1. + TL**2)                                               PRT2   78
      SL   = TL /SQTL                                                       PRT2   79
      CL   = 1. /SQTL                                                       PRT2   80
      GO TO  210                                                            PRT2   81
  190 TL =((Z2(IR) -Z1(IR))/(ZZ2(IR) - ZZ1(IR)))/BETA                       PRT2   82
      GO TO  180                                                            PRT2   83
  200 TL = 0.                                                               PRT2   84
      SQTL = 1.                                                             PRT2   85
      CL = 1.                                                               PRT2   86
      SL = 0.                                                               PRT2   87
      EE = (DELY(IR))/2.                                                    PRT2   88
  210 CONTINUE                                                              PRT2   89
      SSDELR = 0.                                                           PRT2   90
      SSDELI = 0.                                                           PRT2   91
      SDELR = 0.0                                                           PRT2   92
      SDELI = 0.0                                                           PRT2   93
      DELR = 0.0                                                            PRT2   94
      DELI = 0.0                                                            PRT2   95
      SAVE1  =  0.                                                          PRT2   96
      SAVE2  =  0.                                                          PRT2   97
      NDBLE = 0                                                             PRT2   98
  230 CONTINUE                                                              PRT2   99
      LHS = 0                                                               PRT2  100
      IF (KRDBR.LE.SMALL)  GO TO 240                                        PRT2  101
      CALL        INCRO(AX,AY,AZ,AX1,AY1,AZ1,AX2,AY2,AZ2,GAMS,GAMSIG,LHS,   PRT2  102
     1IR, NFF ,IO,NBXS,NCPNB,NDBLE,NBV,DELR,DELI,FL,BETA,SDELX,DELY,KR)     PRT2  103
      SDELR  = SDELR + DELR*(FLOAT(MULT))                                   PRT2  104
      SDELI  = SDELI + DELI*(FLOAT(MULT))                                   PRT2  105
  240 CONTINUE                                                              PRT2  106
      XO = AX                                                               PRT2  107
      YO = AY                                                               PRT2  108
      ZO = AZ                                                               PRT2  109
      CALL        SNPDF(SL,CL,TL,SGS,CGS,SGR,CGR,XO,YO,ZO,EE,DIJ,BETA,CV)   PRT2  110
      SAVE1  = SAVE1 + DIJ *(FLOAT(MULT))                                   PRT2  111
      IF (NDRAG.EQ.0)  GO TO  250                                           PRT2  112
      XPRIME = EV(IQ) - EV(IR)                                              PRT2  113
      CALL        SNPDF(SL,CL,TL,SGS,CGS,SGR,CGR,XO,YO,ZO,EE,DIJ,BETA,CV)   PRT2  114
      DR      = DR     + DIJ *(FLOAT(MULT))                                 PRT2  115
```

```
      SUBROUTINE PRT2 (NYAW,NBV)
C
      REAL    K10,K20,K1RT1,K1IT1,K2RT2P,K2IT2P,K1OT1,K2OT2P
      REAL    KR,KRDBR
C
      COMMON /VARBLS / NCNSM1,NB,NDELT,NDATA,NOPAN,IQ,IR,JSPECS,
     1                 NCARAY(50),NSARAY(50),NBARAY(50),ACAP,B2,FL,PI,
     2                 KR,KRDBR.GMA(50),X(400),Y(400),ZZ(400),Z1(400),
     3                 P1(400),ZZ1(400),Z2(400),P2(400),ZZ2(400),
     4                 EV(400),PV(400),ZV(400),SDELX(400),DELY(400),
     5                 XO(50),YO(50),ZO(50),GGMA(50)
      COMMON  /DLM/  K10,K20,K1RT1,K1IT1,K2RT2P,K2IT2P,K1OT1,K2OT2P,E2
      COMMON /FLUTAN/ FMACH ,BETA  ,VBO   ,RVBO  ,NRVBO
      COMMON  /NTPS/  NTP1,NTP2,NTP3,NTP4,NTP5,NTP6,NTP7,NTP8,NTP9,NTP10
      COMMON / CTAPES / ITAPES
C
      DIMENSION VBO(30), RVBO(15)
      DIMENSION AWW(400), AWWI(400)
      DIMENSION ITAPES(50)
      DIMENSION DPRIME(400)
C
      ITAPEW = ITAPES(6)
C
      FDELT = NDELT
      SMALL = 0.00001
      NFF = 0
      NDRAG= 0
      DO 390  IQ = 1,NCNSM1
      IH = 0
   90 IH = IH + 1
      GAMS  = GMA(IH)
      SGR   = SIN(GAMS)
      CGR   = COS(GAMS)
      NBXR=NBARAY(IH)
      IF(IQ.LE.NBXR) GO TO 100
      GO TO 90
  100 CONTINUE
      IG = 0
      IR = 1
      NB = 0
      IO = 1
  110 IG = IG + 1
      GAMSIG= GMA(IG)
      SGS   = SIN(GAMSIG)
      CGS   = COS(GAMSIG)
      ACGS = ABS(CGS)
      NPS = IG
      NCM1  =  NCARAY(NPS) - 1
      NBXS = NBARAY(NPS)
      NCPNB  = NCM1 + NB
  120 CONTINUE
      MULT = 1
      DR = 0.
      DL = 0.
      IF (IR.LE.NBXS) GO TO 130
      NB = NBXS
      GO TO 110
```

```
STATEMENT LABELS              DEF LINE   REFERENCES
     0  100        INACTIVE      22         21
     0  110        INACTIVE      23         22
    27  120                      26        2*22
    46  200                      33        2*21
     0  210        INACTIVE      40         39
   100  220                      44        2*39
     0  230        INACTIVE      46         45
   111  240                      49        2*45
   112  300                      50         43         48
     0  310        INACTIVE      57         56
   133  320                      59         56
   135  330                      78         56         58
   264  340                     109        104
   302  350                     111       6*109
   345  360                     125       4*123
   420  370                     133       2*131
   451  380                     138        109        123        131
   453  390                     139        109        123       2*131
   473  410                     143       2*123      3*131      4*141
   663  420                     162        109        123        131       2*141
   754  430                     176       4*175
  1002  440                     179       2*175      4*178
  1036  450                     184       2*183
  1042  460                     186        178        183        185
  1045  500                     188        137       3*141      3*175      4*178      6*183      2*185
  1111  510                     202       2*201
  1116  520                     205        201       2*204
  1123  530                     208       4*201       204       2*207
  1156  540                     214       2*201       207       6*213
  1205  900                     221       3*213
  1216  905                     228         32
  1235  907                     237         25

STATISTICS
  PROGRAM LENGTH                1460B      816
       52000B CM USED
```

```
VARIABLES      SN  TYPE           RELOCATION
                                               DEFINED      53
  1434  Q1         REAL                           REFS     125      133      143      155  DEFINED      111
  1445  Q10        REAL                           REFS     125      133      143      155  DEFINED      120
  1446  Q11        REAL                           REFS     125      133      143      155  DEFINED      121
  1435  Q2         REAL                           REFS     125      133      143      155  DEFINED      112
  1436  Q3         REAL                           REFS     125      133      143      155  DEFINED      113
  1437  Q4         REAL                           REFS     125      133      143      155  DEFINED      114
  1440  Q5         REAL                           REFS     125      133      143      155  DEFINED      115
  1441  Q6         REAL                           REFS     125      133      143      155  DEFINED      116
  1442  Q7         REAL                           REFS     125      133      143      155  DEFINED      117
  1443  Q8         REAL                           REFS     125      133      143      155  DEFINED      118
  1444  Q9         REAL                           REFS     125      133      143      155  DEFINED      119
  1377  RFOUR      REAL                           REFS     232      233      234  DEFINED       12
  1376  RTWO       REAL                           REFS    2*12      229      230      231  DEFINED       11
  1374  R1         REAL                           REFS      10     2*11       21     2*51       52       53      105
                                                   107     111      162      166      196      214      218
                                               DEFINED       9       92      168      189
  1375  R1S        REAL                           REFS     168      189  DEFINED       10
  1432  R10        REAL                           REFS     105      107      120      162      166
                                               DEFINED     101
  1433  R11        REAL                           REFS     105      107      121      162      166
                                               DEFINED     102
  1422  R2         REAL                           REFS     105      107      112      162      166
                                               DEFINED      93
  1423  R3         REAL                           REFS     105      107      113      162      166
                                               DEFINED      94
  1424  R4         REAL                           REFS     105      107      114      162      166
                                               DEFINED      95
  1425  R5         REAL                           REFS     105      107      115      162      166
                                               DEFINED      96
  1426  R6         REAL                           REFS     105      107      116      162      166
                                               DEFINED      97
  1427  R7         REAL                           REFS     105      107      117      162      166
                                               DEFINED      98
  1430  R8         REAL                           REFS     105      107      118      162      166
                                               DEFINED      99
  1431  R9         REAL                           REFS     105      107      119      162      166
                                               DEFINED     100
  1401  T1         REAL                           REFS      29       30       31       45      222      223      226
                                               DEFINED      27       41       44       47
  1406  T2         REAL                           REFS      39  DEFINED       38       42
  1405  T2P        REAL                           REFS      38      224      225      227  DEFINED       37
     0  XO         REAL              F.P.         REFS      22       26     2*51       53      198      210      218
                                               DEFINED       1
     0  YO         REAL              F.P.         REFS     2*9     3*37  DEFINED        1
     0  ZO         REAL              F.P.         REFS     2*9     3*37  DEFINED        1

EXTERNALS          TYPE   ARGS      REFERENCES
        COS        REAL      1 LIBRARY    27       29       33       35       41       44      171      194      199
        EXP        REAL      1 LIBRARY    78
        SIN        REAL      1 LIBRARY    30       34       36      170      195      200
        SQRT       REAL      1 LIBRARY     9       51      172      197

INLINE FUNCTIONS   TYPE   ARGS       DEF LINE   REFERENCES
        ABS        REAL      1  INTRIN             39       45       54
        FLOAT      REAL      1  INTRIN            235
```

```
VARIABLES      SN  TYPE          RELOCATION
 1450   DK1R       REAL                          REFS       222   DEFINED     188      211
 1453   DK2I       REAL                          REFS       225   DEFINED     192      220
 1452   DK2R       REAL                          REFS       224   DEFINED     191      219
 1412   E          REAL                          REFS    11*143    11*155  11*162   11*166  DEFINED       78
 1373   EPS        REAL                          REFS        39        45 DEFINED        7
    0   E2         REAL             F.P.         REFS        38   DEFINED       1
    0   FMACH      REAL             F.P.         REFS         8   DEFINED       1
    0   GAMS       REAL             F.P.         REFS        27        33      34       41       44
                                              DEFINED         1
    0   GAMSIG     REAL             F.P.         REFS        27        35      36       41       44
                                              DEFINED         1
 1407   ICHUZ      INTEGER                       REFS        57        59     104      109      123      131      137
                                                  141       175       178     183      185      201      204      207
                                                  213   DEFINED        40      46       49       57       59
 1347   IOUI       REAL                          REFS         2       176     177      179      181
                                              DEFINED       166
 1346   IOUR       REAL                          REFS         2       176     177      179      181
                                              DEFINED       162
 1337   IOOI       REAL                          REFS         2       129     139  DEFINED      107
 1336   IOOR       REAL                          REFS         2       135     138  DEFINED      105
 1353   I1UI       REAL                          REFS         2       209 DEFINED      177      203
 1352   I1UR       REAL                          REFS         2       186     208  DEFINED      176      187      202
 1343   I1OI       REAL                          REFS         2       203 DEFINED      138
 1342   I1OR       REAL                          REFS         2       186     202  DEFINED      139
 1355   I2UI3      REAL                          REFS         2       217 DEFINED      181      206
 1354   I2UR3      REAL                          REFS         2       184     216  DEFINED      179      184      205
 1345   I2OI3      REAL                          REFS         2       206 DEFINED      135
 1344   I2OR3      REAL                          REFS         2       184     205  DEFINED      129
 1351   JOUI       REAL                          REFS         2       179     181  DEFINED      155
 1350   JOUR       REAL                          REFS         2       179     181  DEFINED      143
 1341   JOOI       REAL                          REFS         2       135 DEFINED      133
 1340   JOOR       REAL                          REFS         2       129 DEFINED      125
    0   KKI        REAL             F.P.         REFS         2   DEFINED       1       24      236
    0   KKR        REAL             F.P.         REFS         2   DEFINED       1       23      235
    0   KR         REAL             F.P.         REFS         2        26      52      198  DEFINED        1
 1356   K1         REAL                          REFS         2      2*55     107      129      133      135      138
                                                  139       155       166     169    2*176    2*177    2*179    2*181
                                                  193       215   DEFINED      52
 1365   K1IT1      REAL                          REFS         5       230     236  DEFINED       16       30      223
                                                  230
 1364   K1RT1      REAL                          REFS         5       229     235  DEFINED       15       29      222
                                                  229
 1362   K1O        REAL                          REFS         5       226 DEFINED       13       28      210
 1370   K1OT1      REAL                          REFS         5       231     235  DEFINED       19       31      226
                                                  231
 1361   K2         REAL                          REFS         2        80      81       82       83       84       85
                                                   86        87        88      89       90   11*125      129      135
                                               11*143     2*179     2*181 DEFINED       55
 1367   K2IT2P     REAL                          REFS         5       233     236  DEFINED       18      225      233
 1366   K2RT2P     REAL                          REFS         5       232     235  DEFINED       17      224      232
 1363   K2O        REAL                          REFS         5       227 DEFINED       14      218
 1371   K2OT2P     REAL                          REFS         5       234     235  DEFINED       20      227      234
 1372   L          INTEGER                       REFS       235   DEFINED       6
 1335   M          REAL                          REFS         2      2*50      53      196  DEFINED        8
 1360   MU         REAL                          REFS         2        78  11*143   11*155      169    2*172      173
                                                2*174   DEFINED        54
 1357   MU1        REAL                          REFS         2        54      56      193    2*197      214
```

```
                  K1RT1  = K1RT1 /RTWO                                        TKER      230
  230             K1IT1  = K1IT1 /RTWO                                        TKER      231
                  K1OT1  = K1OT1 /RTWO                                        TKER      232
                  K2RT2P = K2RT2P/RFOUR                                       TKER      233
                  K2IT2P = K2IT2P/RFOUR                                       TKER      234
                  K2OT2P = K2OT2P/RFOUR                                       TKER      235
  235             KKR  = K1RT1+K2RT2P - (K1OT1+K2OT2P)*FLOAT(L)              TKER      236
                  KKI  = K1IT1 + K2IT2P                                       TKER      237
              907 CONTINUE                                                    TKER      238
                  RETURN                                                      TKER      239
                  END                                                         TKER      240


      SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS      DEF LINE      REFERENCES
   3  TKER           1           238

VARIABLES       SN  TYPE          RELOCATION
  1410  BETA2       REAL                          REFS        51       53      214      218   DEFINED       50
  1411  BIGR        REAL                          REFS        53      196      210      214     2*218
                                               DEFINED        51
     0  BR          REAL              F.P.        REFS        26       52      198  DEFINED         1
  1447  CAR         REAL                          REFS       187  DEFINED      186
  1455  CK1I        REAL                          REFS       211      212  DEFINED      209
  1454  CK1R        REAL                          REFS       211      212  DEFINED      208
  1457  CK2I        REAL                          REFS       219      220  DEFINED      217
  1456  CK2R        REAL                          REFS       219      220  DEFINED      216
  1400  C1          REAL                          REFS        29       30     2*37       92       111      143      155
                                                   176       177      179      181      208       216      217
                                               DEFINED        26       33       80      170       194
  1420  C10         REAL                          REFS       101      120      143      155   DEFINED       89
  1421  C11         REAL                          REFS       102      121      143      155   DEFINED       90
  1402  C2          REAL                          REFS      2*37       93      112      143       155      176      177
                                                   179       181      209      216      217   DEFINED       34       81
                                                   171       195
  1403  C3          REAL                          REFS      2*37       94      113      143       155      173      194
                                                   195       208      209    2*214    2*215   DEFINED       35       82
                                                   172       193      196
  1404  C4          REAL                          REFS      2*37       95      114      143       155      174      176
                                                   177     2*179    2*181      208      209     3*214      215
                                               DEFINED        36       83      173      197
  1413  C5          REAL                          REFS        96      115      143      155       179      181      199
                                                   200   DEFINED       84      174      198
  1414  C6          REAL                          REFS        97      116      143      155       170      171      179
                                                   181       211      212      219      220   DEFINED       85      169
                                                   199
  1415  C7          REAL                          REFS        98      117      143      155       211      212      219
                                                   220   DEFINED       86      200
  1416  C8          REAL                          REFS        99      118      143      155       216      217
                                               DEFINED        87      214
  1417  C9          REAL                          REFS       100      119      143      155       216      217
                                               DEFINED        88      215
```

```
      C3= SQRT(1.+MU*MU)                                                TKER     173
      C4= MU/C3                                                         TKER     174
      C5= C4/(1.+MU*MU)                                                 TKER     175
      GO TO  (430,440,430,430,440,430,500,500,500),ICHUZ                TKER     176
  430 I1UR = C2*(1.-C4+K1*IOUI)-C1*K1*IOUR                              TKER     177
      I1UI =-C2*K1*IOUR-C1*(1.-C4+K1*IOUI)                              TKER     178
      GO TO  (500,440,440,460,440,440,500,500,500),ICHUZ                TKER     179
  440 I2UR3 = C2*(2.*(1.-C4)-C5+K1*IOUI+K2*JOUR)+C1*(C6*(1.-C4)-K1*IOUR TKER     180
     1          +K2*JOUI)                                               TKER     181
      I2UI3 = C2*(C6*(1.-C4)-K1*IOUR+K2*JOUI)-C1*(2.*(1.-C4)-C5+K1*IOUI TKER     182
     1          +K2*JOUR)                                               TKER     183
      GO TO  (500,500,500,460,450,450,500,500,500),ICHUZ                TKER     184
  450 I2UR3 = 2.0 * I2OR3 - I2UR3                                       TKER     185
      IF  ( ICHUZ-6 )                    500,460,500                    TKER     186
  460 CAR = 2.*I1OR-I1UR                                                TKER     187
      I1UR= CAR                                                         TKER     188
  500 DK1R=0.                                                           TKER     189
      R1 = R1S                                                          TKER     190
      DK1I=0.                                                           TKER     191
      DK2R=0.                                                           TKER     192
      DK2I=0.                                                           TKER     193
      C3=K1*MU1                                                         TKER     194
      C1=COS(C3)                                                        TKER     195
      C2=SIN(C3)                                                        TKER     196
      C3= M*R1/BIGR                                                     TKER     197
      C4=SQRT(1.+MU1*MU1)                                               TKER     198
      C5=KR*XO/BR                                                       TKER     199
      C6=COS(C5)                                                        TKER     200
      C7=SIN(C5)                                                        TKER     201
      GO TO (530,540,530,530,540,530,510,520,510),ICHUZ                 TKER     202
  510 I1UR=I1OR                                                         TKER     203
      I1UI=I1OI                                                         TKER     204
      IF  ( ICHUZ-7 )                    520,530,520                    TKER     205
  520 I2UR3= I2OR3                                                      TKER     206
      I2UI3= I2OI3                                                      TKER     207
      IF  ( ICHUZ-8 )                    530,540,530                    TKER     208
  530 CK1R = I1UR + C3*C1/C4                                            TKER     209
      CK1I = I1UI - C3*C2/C4                                            TKER     210
      K1O  = 1.0 + XO/BIGR                                              TKER     211
      DK1R = CK1R*C6 + CK1I*C7                                          TKER     212
      DK1I = CK1I*C6 - CK1R*C7                                          TKER     213
      GO TO  (900,540,540,900,540,540,900,540,540),ICHUZ                TKER     214
  540 C8=  (BETA2*(R1/BIGR)**2 + (2.+MU1*C3)/(C4*C4))*(-C3/C4)          TKER     215
      C9= ( K1*C3)*( C3/C4)                                             TKER     216
      CK2R = -I2UR3 + C8*C1 - C9*C2                                     TKER     217
      CK2I = -I2UI3 - C9*C1 - C8*C2                                     TKER     218
      K2O  = -2.0 -XO*(2.0+BETA2*(R1/BIGR)**2)/BIGR                     TKER     219
      DK2R = CK2R*C6 + CK2I*C7                                          TKER     220
      DK2I = CK2I*C6 - CK2R*C7                                          TKER     221
  900 CONTINUE                                                          TKER     222
      K1RT1  = T1 * DK1R                                                TKER     223
      K1IT1  = T1 * DK1I                                                TKER     224
      K2RT2P = T2P* DK2R                                                TKER     225
      K2IT2P = T2P* DK2I                                                TKER     226
      K1OT1  = K1O* T1                                                  TKER     227
      K2OT2P = K2O* T2P                                                 TKER     228
  905 CONTINUE                                                          TKER     229
```

```
      Q5  = R5/ C5                                                      TKER     116
      Q6  = R6/ C6                                                      TKER     117
      Q7  = R7/ C7                                                      TKER     118
      Q8  = R8/ C8                                                      TKER     119
      Q9  = R9/ C9                                                      TKER     120
      Q10 = R10/C10                                                     TKER     121
      Q11 = R11/C11                                                     TKER     122
                                                                        TKER     123
      GO TO  (420,410,410,390,360,360,380,360,360),ICHUZ                TKER     124
                                                                        TKER     125
  360 JOOR =  Q1*(.138384-K2)+Q2*(.553536-K2)+Q3*(1.245456-K2)+Q4*      TKER     126
     1        (2.214144-K2)+Q5*(3.4596-K2)+Q6*(4.981824-K2)+Q7*(6.780816 TKER     127
     2        -K2)+Q8*(8.856576-K2)+Q9*(11.209104-K2)+Q10*(13.8384-K2)+ TKER     128
     3        Q11*(16.744464-K2)                                        TKER     129
      I2OR3= 2.+K1*IOOI+K2*JOOR                                         TKER     130
                                                                        TKER     131
      GO TO  (420,410,410,390,410,390,380,370,370),ICHUZ                TKER     132
                                                                        TKER     133
  370 JOOI = -K1*(.744*Q1+1.488*Q2+2.232*Q3+2.976*Q4+3.72*Q5+4.464*Q6+  TKER     134
     1             5.208*Q7+5.952*Q8+6.696*Q9+7.44*Q10+8.184*Q11)       TKER     135
      I2OI3= -K1*IOOR+K2*JOOI                                           TKER     136
                                                                        TKER     137
      IF  ( ICHUZ .EQ. 8 )                GO TO 500                     TKER     138
  380 I1OI = -K1*IOOR                                                   TKER     139
  390 I1OR = 1.+K1*IOOI                                                 TKER     140
                                                                        TKER     141
      GO TO (420,410,410,420,410,410,500,500,500),ICHUZ                 TKER     142
                                                                        TKER     143
  410 JOUR = E*(Q1*(.138384-K2+.372*MU*C1)+                             TKER     144
     1       E*(Q2*(.553536-K2+.744*MU*C2)+                             TKER     145
     2       E*(Q3*(1.245456-K2+1.116*MU*C3)+                           TKER     146
     3       E*(Q4*(2.214144-K2+1.488*MU*C4)+                           TKER     147
     4       E*(Q5*(3.4596-K2+1.86*MU*C5)+                              TKER     148
     5       E*(Q6*(4.981824-K2+2.232*MU*C6)+                           TKER     149
     6       E*(Q7*(6.780816-K2+2.604*MU*C7)+                           TKER     150
     7       E*(Q8*(8.856576-K2+2.976*MU*C8)+                           TKER     151
     8       E*(Q9*(11.209104-K2+3.348*MU*C9)+                          TKER     152
     9       E*(Q10*(13.8384-K2+3.72*MU*C10)+                           TKER     153
     A       E*(Q11*(16.744464-K2+4.092*MU*C11)))))))))))               TKER     154
                                                                        TKER     155
       JOUI = -K1*(E*(Q1*(.744+MU*C1) + E*(Q2*(1.488+MU*C2) +           TKER     156
     1             E*(Q3*(2.232+MU*C3)+ E*(Q4*(2.976+MU*C4) +           TKER     157
     2             E*(Q5*(3.72+MU*C5) + E*(Q6*(4.464+MU*C6) +           TKER     158
     3             E*(Q7*(5.208+MU*C7) + E*(Q8*(5.952+MU*C8) +          TKER     159
     4             E*(Q9*(6.696+MU*C9) + E*(Q10*(7.44+MU*C10) +         TKER     160
     5             E*(Q11*(8.184+MU*C11))))))))))))                     TKER     161
                                                                        TKER     162
  420 IOUR = .372*E*(R1+E*(2.*R2+E*(3.*R3+E*(4.*R4+E*(5.*R5+E*(6.*R6+   TKER     163
     1             E*(7.*R7+E*(8.*R8+E*(9.*R9+E*(10.*R10+E*11.*R11))))))  TKER     164
     2                  ))))                                            TKER     165
                                                                        TKER     166
      IOUI = -K1*(E*(R1+E*(R2+E*(R3+E*(R4+E*(R5+E*(R6+E*(R7+E*(R8+E*(R9  TKER     167
     1             +E*(R10+E*R11))))))))))                              TKER     168
      R1  = R1S                                                         TKER     169
      C6= K1*MU                                                         TKER     170
      C1= SIN(C6)                                                       TKER     171
      C2= COS(C6)                                                       TKER     172
```

```
      GO TO 330                                                          TKER     59
  320 ICHUZ=ICHUZ+6                                                      TKER     60
C   (N*C)**2  FOR  N=1,11  AND C=.372 =                                  TKER     61
C                                                                        TKER     62
C     .138384        .553536       1.245456      2.214144                TKER     63
C    3.4596         4.981824       6.780816      8.856576                TKER     64
C   11.209104      13.8384        16.744464                              TKER     65
C                                                                        TKER     66
C   (N*C)  FOR  N=1,12  AND  14,16,18,20,22   =                          TKER     67
C                                                                        TKER     68
C      .744         1.116          1.488          1.86        2.232      TKER     69
C     2.604         2.976          3.348          3.72        4.092      TKER     70
C     4.464         5.208          5.952          6.696       7.44       TKER     71
C     8.184                                                              TKER     72
C                                                                        TKER     73
C   A(N)  FORN(=1,11  =                                                  TKER     74
C                                                                        TKER     75
C     .24186198       -2.7918027        24.991079      -111.59196        TKER     76
C  271.43549        -305.75288         -41.18363        545.98537        TKER     77
C -644.78155         328.72755         -64.279511                        TKER     78
  330 E= EXP (-.372*MU)                                                  TKER     79
                                                                         TKER     80
      C1 = .138384+K2                                                    TKER     81
      C2 = .553536+K2                                                    TKER     82
      C3 = 1.245456+K2                                                   TKER     83
      C4  = 2.214144 +K2                                                 TKER     84
      C5  = 3.4596   +K2                                                 TKER     85
      C6  = 4.981824 +K2                                                 TKER     86
      C7  = 6.780816 +K2                                                 TKER     87
      C8  = 8.856576 +K2                                                 TKER     88
      C9  = 11.209104+K2                                                 TKER     89
      C10 = 13.8384  +K2                                                 TKER     90
      C11 = 16.744464+K2                                                 TKER     91
                                                                         TKER     92
      R1  = .24186198 / C1                                               TKER     93
      R2  =-2.7918027 / C2                                               TKER     94
      R3  = 24.991079 / C3                                               TKER     95
      R4  =-111.59196 / C4                                               TKER     96
      R5  = 271.43549 / C5                                               TKER     97
      R6  =-305.75288 / C6                                               TKER     98
      R7  =-41.18363  / C7                                               TKER     99
      R8  = 545.98537 / C8                                               TKER    100
      R9  =-644.78155 / C9                                               TKER    101
      R10 = 328.72755 / C10                                              TKER    102
      R11 =-64.279511 / C11                                              TKER    103
                                                                         TKER    104
      IF  ( ICHUZ .LT. 4 )                          GO TO 340            TKER    105
      IOOR = .372*(R1 +2.*R2 + 3.*R3 + 4.*R4 + 5.*R5 + 6.*R6 + 7.*R7 +   TKER    106
     1        8.*R8 + 9.*R9 + 10.*R10 + 11.*R11)                         TKER    107
      IOOI = -K1*(R1+R2+R3+R4+R5+R6+R7+R8+R9+R10+R11)                    TKER    108
                                                                         TKER    109
  340 GO TO  (420,350,350,390,350,350,380,350,350),ICHUZ                 TKER    110
                                                                         TKER    111
  350 Q1  = R1/ C1                                                       TKER    112
      Q2  = R2/ C2                                                       TKER    113
      Q3  = R3/ C3                                                       TKER    114
      Q4  = R4/ C4                                                       TKER    115
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STATEMENT LABELS            DEF LINE   REFERENCES
  52  120                      51        196
  60  130                      58         55
 117  180                      75         82
 130  190                      81         70
 136  200                      83         73
 144  210                      88         80
 151  230                      98        125
 164  240                     105        100
 206  25υ                     115        111
 224  270                     126        116
 241  280                     137        129       130
 270  310                     153        180
 303  320                     160        155
 325  330                     170        166
 344  350                     181        128       131       136       171
 377  360                     197        193
 416  380                     201        198
   0  390                     202         28

LOOPS  LABEL    INDEX     FROM-TO     LENGTH     PRO·ERTIES
  15   390      IQ          28 202     420B               EXT REFS  NOT INNER
 405            I          200 200      10B               EXT REFS
 421            I          201 201      10B               EXT REFS

COMMON BLOCKS   LENGTH     MEMBERS - BIAS NAME(LENGTH)
       VARBLS     6014              0 NCNSM1 (1)              1 NB     (1)              2 NDELT  (1)
                                    3 NDATA  (1)              4 NOPAN  (1)              5 IQ     (1)
                                    6 IR     (1)              7 JSPECS (1)              8 NCARAY (50)
                                   58 NSARAY (50)           108 NBARAY (50)           158 ACAP   (1)
                                  159 B2     (1)            160 FL     (1)            161 PI     (1)
                                  162 KR     (1)            163 KRDBR  (1)            164 GMA    (50)
                                  214 X      (400)          614 Y      (400)         1014 ZZ     (400)
                                 1414 Z1     (400)         1814 P1     (400)         2214 ZZ1    (400)
                                 2614 Z2     (400)         3014 P2     (400)         3414 ZZ2    (400)
                                 3814 EV     (400)         4214 PV     (400)         4614 ZV     (400)
                                 5014 SDELX  (400)         5414 DELY   (400)         5814 XO     (50)
                                 5864 YO     (50)          5914 ZO     (50)          5964 GGMA   (50)
       DLM           9              0 K1O    (1)              1 K2O    (1)              2 K1RT1  (1)
                                    3 K1IT1  (1)              4 K2RT2P (1)              5 K2IT2P (1)
                                    6 K1OT1  (1)              7 K2OT2P (1)              8 E2     (1)
       FLUTAN       48              0 FMACH  (1)              1 BETA   (1)              2 VBO    (30)
                                   32 RVBO   (15)            47 NRVBO  (1)
       NTPS         10              0 NTP1   (1)              1 NTP2   (1)              2 NTP3   (1)
                                    3 NTP4   (1)              4 NTP5   (1)              5 NTP6   (1)
                                    6 NTP7   (1)              7 NTP8   (1)              8 NTP9   (1)
                                    9 NTP10  (1)
       CTAPES       50              0 ITAPES (50)

STATISTICS
  PROGRAM LENGTH               3127B    1623
  CM LABELED COMMON LENGTH    13763B    6131
         52000B CM USED
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      SUBROUTINE INCRO(AX,AY,AZ,AX1,AY1,AZ1,AX2,AY2,AZ2,GAMS,GAMSIG,LHS, INCRO    2
     1IR, NFF ,IO,NBXS,NCPNB,NDBLE,NBV,DELR,DELI,FL,BETA,SDELX,DELY,KR)  INCRO    3
C     COMBINED  KERNEL-INTEGRATION PROGRAM                               INCRO    4
      REAL   K10,K20,K1RT1,K1IT1,K2RT2P,K2IT2P,K1OT1,K2OT2P              INCRO    5
      COMMON  /DLM/  K10,K20,K1RT1,K1IT1,K2RT2P,K2IT2P,K1OT1,K2OT2P,E2   INCRO    6
      COMMON /COMA/ LC(40) , CR                                          INCRO    7
      DIMENSION SDELX(400),DELY(400)                                     INCRO    8
      DIMENSION XUSE1(30,2),XUSE2(30,2),XUSE3(30,2),XUSE4(30,2)          INCRO    9
      DIMENSION USE1(30,2), USE2(30,2), USE3(30,2), USE4(30,2)           INCRO   10
      REAL   M, KKR, KKI, KR                                             INCRO   11
      NFF  = 0                                                           INCRO   12
      M = SQRT(1.0 - BETA**2)                                            INCRO   13
      BR  =  12.0 * CR                                                   INCRO   14
      EPS = 0.00001                                                      INCRO   15
      XDELX = SDELX(IR)                                                  INCRO   16
      XDELY =  DELY(IR)                                                  INCRO   17
      SFN = SIN(GAMSIG)                                                  INCRO   18
      CFN = COS(GAMSIG)                                                  INCRO   19
                                                                         INCRO   20
      EE = 0.5*XDELY                                                     INCRO   21
      E2   = EE**2                                                       INCRO   22
      KKR = 0.0                                                          INCRO   23
      KKI = 0.0                                                          INCRO   24
      DELR = 0.0                                                         INCRO   25
      DELI = 0.0                                                         INCRO   26
      AT1S = 0.0                                                         INCRO   27
      AT2S = 0.0                                                         INCRO   28
      T1   = 0.0                                                         INCRO   29
      T2  = 0.0                                                          INCRO   30
      COUNT =0.                                                          INCRO   31
      XO=AX                                                              INCRO   32
      YO=AY                                                              INCRO   33
      ZO=AZ                                                              INCRO   34
      IF (NFF.EQ.0) GO TO 80                                             INCRO   35
      CALL      KERNEL(XO,YO,ZO,KR,BR,GAMS,GAMSIG,M,EPS,T1,T2)           INCRO   36
      DELR = KKR                                                         INCRO   37
      DELI = KKI                                                         INCRO   38
      GO TO 260                                                          INCRO   39
   80 CONTINUE                                                           INCRO   40
      CALL      KERNEL(XO,YO,ZO,KR,BR,GAMS,GAMSIG,M,EPS,T1,T2)           INCRO   41
      AT1  = ABS(T1)                                                     INCRO   42
      AT2  = ABS(T2)                                                     INCRO   43
      IF (AT1.GT.AT1S)  AT1S=AT1                                         INCRO   44
      IF (AT2.GT.AT2S)  AT2S=AT2                                         INCRO   45
      IF (COUNT)130,90,150                                               INCRO   46
   90 DKRC  = K1RT1 - K1OT1                                              INCRO   47
      DKIC  = K1IT1                                                      INCRO   48
      XKRC  = K2RT2P-K2OT2P                                              INCRO   49
      XKIC  = K2IT2P                                                     INCRO   50
      AT2 = ABS(T2)                                                      INCRO   51
      JO = 1                                                             INCRO   52
      IF (NDBLE.NE.0) JO = 2                                             INCRO   53
      IF (IR.LE.NCPNB) GO TO  110                                        INCRO   54
      IF (IR.GT.NBXS) GO TO 110                                          INCRO   55
      IF (LHS.NE.0) GO TO  100                                           INCRO   56
      DKRI = USE1(IO,JO)                                                 INCRO   57
      DKII = USE2(IO,JO)                                                 INCRO   58
```

```
          XKRI   = XUSE1(IO,JO)                                             INCRO      59
          XKII   = XUSE2(IO,JO)                                             INCRO      60
          XO    = AX2                                                       INCRO      61
          YO    = AY2                                                       INCRO      62
          ZO = AZ2                                                          INCRO      63
          CALL       KERNEL(XO,YO,ZO,KR,BR,GAMS,GAMSIG,M,EPS,T1,T2)         INCRO      64
          AT1   = ABS(T1)                                                   INCRO      65
          AT2   = ABS(T2)                                                   INCRO      66
          IF (AT1.GT.AT1S)  AT1S=AT1                                        INCRO      67
          IF (AT2.GT.AT2S)  AT2S=AT2                                        INCRO      68
          DKRO   = K1RT1 - K1OT1                                            INCRO      69
          DKIO   = K1IT1                                                    INCRO      70
          XKRO   = K2RT2P-K2OT2P                                            INCRO      71
          XKIO   = K2IT2P                                                   INCRO      72
          GO TO  170                                                        INCRO      73
      100 XO = AX1                                                          INCRO      74
          YO = AY1                                                          INCRO      75
          ZO = AZ1                                                          INCRO      76
          CALL       KERNEL(XO,YO,ZO,KR,BR,GAMS,GAMSIG,M,EPS,T1,T2)         INCRO      77
          AT1   = ABS(T1)                                                   INCRO      78
          AT2   = ABS(T2)                                                   INCRO      79
          IF (AT1.GT.AT1S)  AT1S=AT1                                        INCRO      80
          IF (AT2.GT.AT2S)  AT2S=AT2                                        INCRO      81
          DKRI   = K1RT1 - K1OT1                                            INCRO      82
          DKII   = K1IT1                                                    INCRO      83
          XKRI   = K2RT2P-K2OT2P                                            INCRO      84
          XKII   = K2IT2P                                                   INCRO      85
          DKRO = USE3(IO,JO)                                                INCRO      86
          DKIO = USE4(IO,JO)                                                INCRO      87
          XKRO   = XUSE3(IO,JO)                                             INCRO      88
          XKIO   = XUSE4(IO,JO)                                             INCRO      89
          GO TO  160                                                        INCRO      90
      110 CONTINUE                                                          INCRO      91
          COUNT =-1.                                                        INCRO      92
      120 XO = AX1                                                          INCRO      93
          YO = AY1                                                          INCRO      94
          ZO = AZ1                                                          INCRO      95
          GO TO 80                                                          INCRO      96
      130 DKRI   = K1RT1 - K1OT1                                            INCRO      97
          DKII   = K1IT1                                                    INCRO      98
          XKRI   = K2RT2P-K2OT2P                                            INCRO      99
          XKII   = K2IT2P                                                   INCRO     100
      140 COUNT = 1.                                                        INCRO     101
          XO=AX2                                                            INCRO     102
          YO=AY2                                                            INCRO     103
          ZO=AZ2                                                            INCRO     104
          GO TO 80                                                          INCRO     105
      150 DKRO   = K1RT1 - K1OT1                                            INCRO     106
          DKIO   = K1IT1                                                    INCRO     107
          XKRO   = K2RT2P-K2OT2P                                            INCRO     108
          XKIO   = K2IT2P                                                   INCRO     109
          JO = 1                                                            INCRO     110
          IF (NDBLE.NE.O) JO = 2                                            INCRO     111
          IF (LHS.EQ.O) GO TO  170                                          INCRO     112
      160 USE3(IO,JO) = DKRI                                                INCRO     113
          USE4(IO,JO) = DKII                                                INCRO     114
          XUSE3(IO,JO)= XKRI                                                INCRO     115
```

```
            XUSE4(IO,JO)= XKII                                              INCRO     116
            GO TO 180                                                       INCRO     117
        170 USE1(IO,JO) = DKRO                                              INCRO     118
            USE2(IO,JO) = DKIO                                              INCRO     119
            XUSE1(IO,JO)= XKRO                                              INCRO     120
            XUSE2(IO,JO)= XKIO                                              INCRO     121
        180 CONTINUE                                                        INCRO     122
            XO = AX                                                         INCRO     123
            YO = AY                                                         INCRO     124
            ZO = AZ                                                         INCRO     125
            ZERO = 0.0                                                      INCRO     126
            XIIJR= 0.                                                       INCRO     127
            XIIJI= 0.                                                       INCRO     128
            DIIJR= 0.0                                                      INCRO     129
            DIIJI= 0.0                                                      INCRO     130
            PI    = 3.1415926                                               INCRO     131
            XMULT =((XDELX)/(8.0*PI))                                       INCRO     132
            IF ((YO.EQ.ZERO).AND.(ZO.EQ.ZERO))  GO TO 220                   INCRO     133
            IF   ((ZO.EQ.ZERO).AND.(SFN.EQ.ZERO))  GO TO 230                INCRO     134
        190 ETAO1 = YO*CFN + ZO*SFN                                         INCRO     135
            ZETO1 =-YO*SFN + ZO*CFN                                         INCRO     136
            AZETO = ABS(ZETO1)                                              INCRO     137
            IF (AZETO.LE.0.0001)  ZETO1 = 0.                                INCRO     138
        200 R1SQX = ETAO1**2 + ZETO1**2                                     INCRO     139
        210 ARE = (DKRI -2.*DKRC + DKRO)/(2.0*E2)                           INCRO     140
            AIM = (DKII -2.*DKIC + DKIO)/(2.0*E2)                           INCRO     141
            BRE = (DKRO - DKRI)/(2.0*EE)                                    INCRO     142
            BIM = (DKIO - DKII)/(2.0*EE)                                    INCRO     143
            CRE =  DKRC                                                     INCRO     144
            CIM =  DKIC                                                     INCRO     145
            GO TO 250                                                       INCRO     146
        220 ETAO1 = 0.0                                                     INCRO     147
            ZETO1 = 0.0                                                     INCRO     148
            R1SQX = 0.0                                                     INCRO     149
            GO TO  210                                                      INCRO     150
        230 ETAO1  = YO*CFN                                                 INCRO     151
            ZETO1  = 0.                                                     INCRO     152
        240 R1SQX  = ETAO1**2                                               INCRO     153
            GO TO  210                                                      INCRO     154
        250 CONTINUE                                                        INCRO     155
            IF (AT1S.EQ.0.0)  GO TO 255                                     INCRO     156
            CALL        IDF1 (EE,E2,AT2,ETAO1,ZETO1,ARE,AIM,BRE,BIM,CRE,CIM,   INCRO     157
           1                  R1SQX,XIIJR,XIIJI)                            INCRO     158
            DELR =XMULT*XIIJR                                               INCRO     159
            DELI =XMULT*XIIJI                                               INCRO     160
        255 CONTINUE                                                        INCRO     161
            IF (AT2S.EQ.0.0)  GO TO 260                                     INCRO     162
            A2R  = (XKRI - 2.0*XKRC + XKRO)/(2.0*E2)                        INCRO     163
            A2I  = (XKII - 2.0*XKIC + XKIO)/(2.0*E2)                        INCRO     164
            B2R  = (XKRO - XKRI)/(2.0*EE)                                   INCRO     165
            B2I  = (XKIO - XKII)/(2.0*EE)                                   INCRO     166
            C2R  =  XKRC                                                    INCRO     167
            C2I  =  XKIC                                                    INCRO     168
            CALL        IDF2(EE,E2,AT2,ETAO1,ZETO1,A2R,A2I,B2R,B2I,C2R,C2I,    INCRO     169
           1                 R1SQX,DIIJR,DIIJI)                             INCRO     170
            DELR = DELR + XMULT*DIIJR                                       INCRO     171
            DELI = DELI + XMULT*DIIJI                                       INCRO     172
```

```
                C                                                                      INCRO     173
                C                                                                      INCRO     174
                C FORMATS                                                              INCRO     175
    175         C                                                                      INCRO     176
                  10 FORMAT (1HO,6E20.8)                                               INCRO     177
                C                                                                      INCRO     178
                 260 RETURN                                                            INCRO     179
                     END                                                               INCRO     180
```

SYMBOLIC REFERENCE MAP (R=3)

```
ENTRY POINTS      DEF LINE      REFERENCES
    3  INCRO           1         178

VARIABLES      SN  TYPE            RELOCATION
  575  AIM         REAL                          REFS       156   DEFINED      140
  574  ARE         REAL                          REFS       156   DEFINED      139
  542  AT1         REAL                          REFS      2*43      2*66     2*79   DEFINED       41        64        77
  532  AT1S        REAL                          REFS        43        66       79       155  DEFINED        26        43
                                                   66        79
  543  AT2         REAL                          REFS      2*44      2*67     2*80       156      168
                                              DEFINED        42        50       65        78
  533  AT2S        REAL                          REFS        44        67       80       161  DEFINED        27        44
                                                   67        80
    O  AX          REAL                F.P.      REFS        31       122  DEFINED         1
    O  AX1         REAL                F.P.      REFS        73        92  DEFINED         1
    O  AX2         REAL                F.P.      REFS        60       101  DEFINED         1
    O  AY          REAL                F.P.      REFS        32       123  DEFINED         1
    O  AY1         REAL                F.P.      REFS        74        93  DEFINED         1
    O  AY2         REAL                F.P.      REFS        61       102  DEFINED         1
    O  AZ          REAL                F.P.      REFS        33       124  DEFINED         1
  572  AZETO       REAL                          REFS       137   DEFINED      136
    O  AZ1         REAL                F.P.      REFS        75        94  DEFINED         1
    O  AZ2         REAL                F.P.      REFS        62       103  DEFINED         1
  603  A2I         REAL                          REFS       168   DEFINED      163
  602  A2R         REAL                          REFS       168   DEFINED      162
    O  BETA        REAL                F.P.      REFS        12   DEFINED        1
  577  BIM         REAL                          REFS       156   DEFINED      142
  523  BR          REAL                          REFS        35        40       63        76  DEFINED        13
  576  BRE         REAL                          REFS       156   DEFINED      141
  605  B2I         REAL                          REFS       168   DEFINED      165
  604  B2R         REAL                          REFS       168   DEFINED      164
  530  CFN         REAL                          REFS       134       135      150   DEFINED       18
  601  CIM         REAL                          REFS       156   DEFINED      144
  536  COUNT       REAL                          REFS        45   DEFINED       30        91      100
   50  CR          REAL                COMA      REFS         6        13
  600  CRE         REAL                          REFS       156   DEFINED      143
  607  C2I         REAL                          REFS       168   DEFINED      167
  606  C2R         REAL                          REFS       168   DEFINED      166
    O  DELI        REAL                F.P.      REFS       171   DEFINED        1        25       37       159       171
    O  DELR        REAL                F.P.      REFS       170   DEFINED        1        24       36       158       170
    O  DELY        REAL       ARRAY    F.P.      REFS         7        16  DEFINED         1
  565  [illegible] REAL                          REFS       168       171  DEFINED       129
```

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        SUBROUTINE INCRO       74/74    OPT=1                             FTN 4.8+577       85/01/23. 08.10.44       PAGE      5

VARIABLES        SN  TYPE              RELOCATION
   564  DIIJR        REAL                             REFS        168       170   DEFINED       128
   545  DKIC         REAL                             REFS        140       144   DEFINED        47
   552  DKII         REAL                             REFS        113       140       142   DEFINED        57        82        97
   556  DKIO         REAL                             REFS        118       140       142   DEFINED        69        86       106
   544  DKRC         REAL                             REFS        139       143   DEFINED        46
   551  DKRI         REAL                             REFS        112       139       141   DEFINED        56        81        96
   555  DKRO         REAL                             REFS        117       139       141   DEFINED        68        85       105
   531  EE           REAL                             REFS         21       141       142       156       164       165       168
                                                   DEFINED         20
   524  EPS          REAL                             REFS         35        40        63        76   DEFINED        14
   570  ETA01        REAL                             REFS        138       152       156       168   DEFINED       134       146
                                                       150
    10  E2           REAL                  DLM        REFS          5       139       140       156       162       163       168
                                                   DEFINED         21
     0  FL           REAL        *UNUSED    F.P.   DEFINED          1
     0  GAMS         REAL                   F.P.      REFS         35        40        63        76   DEFINED         1
     0  GAMSIG       REAL                   F.P.      REFS         17        18        35        40        63        76
                                                   DEFINED          1
     0  IO           INTEGER                F.P.      REFS         56        57        58        59        85        86        87
                                                        88        112       113       114       115       117       118       119
                                                       120    DEFINED         1
     0  IR           INTEGER                F.P.      REFS         15        16        53        54   DEFINED         1
   550  JO           INTEGER                          REFS         56        57        58        59        85        86        87
                                                        88        112       113       114       115       117       118       119
                                                       120    DEFINED        51        52       109       110
   522  KKI          REAL                             REFS         10        37   DEFINED        23
   521  KKR          REAL                             REFS         10        36   DEFINED        22
     0  KR           REAL                   F.P.      REFS         10        35        40        63        76
                                                   DEFINED          1
     3  K1IT1        REAL                  DLM        REFS          4         5        47        69        82        97       106
     2  K1RT1        REAL                  DLM        REFS          4         5        46        68        81        96       105
     0  K10          REAL                  DLM        REFS          4         5
     6  K10T1        REAL                  DLM        REFS          4         5        46        68        81        96       105
     5  K2IT2P       REAL                  DLM        REFS          4         5        49        71        84        99       108
     4  K2RT2P       REAL                  DLM        REFS          4         5        48        70        83        98       107
     1  K20          REAL                  DLM        REFS          4         5
     7  K20T2P       REAL                  DLM        REFS          4         5        48        70        83        98       107
     0  LC           INTEGER     ARRAY     COMA       REFS          6
     0  LHS          INTEGER                F.P.      REFS         55       111   DEFINED         1
   520  M            REAL                             REFS         10        35        40        63        76
                                                   DEFINED         12
     0  NBV          INTEGER     *UNUSED    F.P.   DEFINED          1
     0  NSXS         INTEGER                F.P.      REFS         54   DEFINED         1
     0  NCPNB        INTEGER                F.P.      REFS         53   DEFINED         1
     0  NDBLE        INTEGER                F.P.      REFS         52       110   DEFINED         1
     0  NFF          INTEGER                F.P.      REFS         34   DEFINED         1        11
   566  PI           REAL                             REFS        131   DEFINED       130
   573  R1SQX        REAL                             REFS        156       168   DEFINED       138       148       152
     0  SDELX        REAL        ARRAY      F.P.      REFS          7        15   DEFINED         1
   527  SFN          REAL                             REFS        133       134       135   DEFINED        17
   534  T1           REAL                             REFS         35        40        41        63        64        76        77
                                                   DEFINED         28
   535  T2           REAL                             REFS         35        40        42        50        63        65        76
                                                        78    DEFINED        29
  1170  USE1         REAL        ARRAY                REFS          9        56   DEFINED       117
  1264  USE2         REAL        ARRAY                REFS          9        57   DEFINED       118
  1360  USE3         REAL        ARRAY                REFS          9        85   DEFINED       112
```

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VARIABLES      SN  TYPE          RELOCATION
 1454  USE4       REAL      ARRAY             REFS        9       86   DEFINED      113
  525  XDELX      REAL                        REFS      131  DEFINED        15
  526  XDELY      REAL                        REFS       20  DEFINED        16
  563  XIIJI      REAL                        REFS      156      159   DEFINED      127
  562  XIIJR      REAL                        REFS      156      158   DEFINED      126
  547  XKIC       REAL                        REFS      163      167   DEFINED       49
  554  XKII       REAL                        REFS      115      163       165  DEFINED       59       84       99
  560  XKIO       REAL                        REFS      120      163       165  DEFINED       71       88      108
  546  XKRC       REAL                        REFS      162      166   DEFINED       48
  553  XKRI       REAL                        REFS      114      162       164  DEFINED       58       83       98
  557  XKRO       REAL                        REFS      119      162       164  DEFINED       70       87      107
  567  XMULT      REAL                        REFS      158      159       170      171  DEFINED      131
  610  XUSE1      REAL      ARRAY             REFS        8       58   DEFINED      119
  704  XUSE2      REAL      ARRAY             REFS        8       59   DEFINED      120
 1000  XUSE3      REAL      ARRAY             REFS        8       87   DEFINED      114
 1074  XUSE4      REAL      ARRAY             REFS        8       88   DEFINED      115
  537  XO         REAL                        REFS       35       40        63       76  DEFINED       31       60
                                                73       92      101       122
  540  YO         REAL                        REFS       35       40        63       76      132      134      135
                                               150  DEFINED       32        61       74       93      102      123
  561  ZERO       REAL                        REFS    2*132    2*133   DEFINED      125
  571  ZETO1      REAL                        REFS      136      138       156      168  DEFINED      135      137
                                               147      151
  541  ZO         REAL                        REFS       35       40        63       76      132      133      134
                                               135  DEFINED       33        62       75       94      103      124

EXTERNALS         TYPE   ARGS        REFERENCES
       COS        REAL     1 LIBRARY     18
       IDF1               14            156
       IDF2               14            168
       KERNEL             11             35       40       63       76
       SIN        REAL     1 LIBRARY     17
       SQRT       REAL     1 LIBRARY     12

INLINE FUNCTIONS  TYPE   ARGS         DEF LINE  REFERENCES
       ABS        REAL     1  INTRIN               41       42       50       64       65       77       78      136

STATEMENT LABELS                DEF LINE    REFERENCES
  504  10        FMT  NO REFS     176
   56  80                          39          34       95      104
    0  90          INACTIVE        46          45
  167  100                         73          55
  233  110                         90          53       54
    0  120         INACTIVE        92
  242  130                         96          45
    0  140         INACTIVE       100
  261  150                        105          45
  276  160                        112          89
  307  170                        117          72      111
  317  180                        121         116
    0  190         INACTIVE       134
    0  200         INACTIVE       138
  350  210                        139         149      153
  366  220                        146         132
  371  230                        150         133
    0  240         INACTIVE       152
  375  250                        154         145
```

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STATEMENT LABELS              DEF LINE   REFERENCES
  404  255                       160        155
  431  260                       178         38        161

COMMON BLOCKS   LENGTH     MEMBERS - BIAS NAME(LENGTH)
       DLM          9                0 K10     (1)            1 K20     (1)              2 K1RT1  (1)
                                     3 K1IT1   (1)            4 K2RT2P  (1)              5 K2IT2P (1)
                                     6 K10T1   (1)            7 K20T2P  (1)              8 E2     (1)
       COMA        41                0 LC     (40)           40 CR      (1)

STATISTICS
  PROGRAM LENGTH                1550B      872
  CM LABELED COMMON LENGTH        62B       50
        52000B CM USED
```

```
      SUBROUTINE KERNEL(XO,YO,ZO,KR,BR,GAMS,GAMSIG,M,EPS,T1,T2)              KERNEL     2
      REAL   M, KR, KKR, KKI, IOOR, IOOI, JOOR, JOOI, I1OR, I1OI, I2OR3,  KERNEL     3
     1       I2OI3, IOUR, IOUI, JOUR, JOUI, I1UR, I1UI, I2UR3, I2UI3,      KERNEL     4
     2       K1, MU1, MU, K2                                               KERNEL     5
      REAL   K1O,K2O,K1RT1,K1IT1,K2RT2P,K2IT2P,K1OT1,K2OT2P                KERNEL     6
      COMMON  /DLM/  K1O,K2O,K1RT1,K1IT1,K2RT2P,K2IT2P,K1OT1,K2OT2P,E2     KERNEL     7
      PI    = 3 1415926                                                    KERNEL     8
      K1O    = 0.0                                                         KERNEL     9
      K2O    = 0 0                                                         KERNEL    10
      K1RT1  = 0.0                                                         KERNEL    11
      K1IT1  = 0.0                                                         KERNEL    12
      K2RT2P = 0.0                                                         KERNEL    13
      K2IT2P = 0.0                                                         KERNEL    14
      K1OT1  = 0.0                                                         KERNEL    15
      K2OT2P = 0.0                                                         KERNEL    16
      R1= SQRT (YO*YO+ZO*ZO)                                               KERNEL    17
      R1S = R1                                                             KERNEL    18
      IF  ( R1 )            200,100,200                                    KERNEL    19
  100.IF  ( XO )            110,120,120                                    KERNEL    20
  110 KKR=O.                                                               KERNEL    21
      KKI=O.                                                               KERNEL    22
      GO TO  905                                                           KERNEL    23
  120 C1= KR*XO/BR                                                         KERNEL    24
      T1= COS(GAMS-GAMSIG)                                                 KERNEL    25
      KKR= 2.*(COS(C1)-1.)*T1                                              KERNEL    26
      KKI=-2.*SIN(C1)*T1                                                   KERNEL    27
      K1O    = 2.0                                                         KERNEL    28
      K1RT1  = 2.0*T1*COS(C1)                                              KERNEL    29
      K1IT1  =-2.0*T1*SIN(C1)                                              KERNEL    30
      K1OT1  = 2.0*T1                                                      KERNEL    31
      GO TO  905                                                           KERNEL    32
  200 C1=COS(GAMS)                                                         KERNEL    33
      C2=SIN(GAMS)                                                         KERNEL    34
      C3=COS(GAMSIG)                                                       KERNEL    35
      C4=SIN(GAMSIG)                                                       KERNEL    36
      T2P=(ZO*ZO*C1*C3+YO*YO*C2*C4-ZO*YO*(C2*C3+C1*C4))                   KERNEL    37
      T2 = T2P/E2                                                          KERNEL    38
      IF  ( ABS(T2)-EPS )             210,220,220                          KERNEL    39
  210 ICHUZ=1                                                              KERNEL    40
      T1= COS(GAMS-GAMSIG)                                                 KERNEL    41
      T2=O.                                                                KERNEL    42
      GO TO 300                                                            KERNEL    43
  220 T1= COS(GAMS-GAMSIG)                                                 KERNEL    44
      IF  ( ABS(T1)-EPS )             230,240,240                          KERNEL    45
  230 ICHUZ=2                                                              KERNEL    46
      T1=O.                                                                KERNEL    47
      GO TO 300                                                            KERNEL    48
  240 ICHUZ=3                                                              KERNEL    49
  300 BETA2 = (1.-M*M)                                                     KERNEL    50
      BIGR = SQRT (XO*XO+BETA2*R1*R1)                                      KERNEL    51
      K1= KR*R1/BR                                                         KERNEL    52
      MU1= (M*BIGR-XO)/ (BETA2*R1)                                         KERNEL    53
      MU=ABS(MU1)                                                          KERNEL    54
      K2=K1*K1                                                             KERNEL    55
      IF  ( MU1 )           310,320,330                                    KERNEL    56
  310 ICHUZ=ICHUZ+3                                                        KERNEL    57
      GO TO 330                                                            KERNEL    58
```

```
      320 ICHUZ=ICHUZ+6                                                     KERNEL    59
    C   (N*C)**2  FOR  N=1,11  AND C=.372 =                                 KERNEL    60
    C                                                                       KERNEL    61
    C      .138384        .553536        1.245456        2.214144           KERNEL    62
    C    3.4596          4.981824        6.780816        8.856576           KERNEL    63
    C   11.209104       13.8384         16.744464                           KERNEL    64
    C                                                                       KERNEL    65
    C   (N*C)  FOR  N=1,12  AND  14,16,18,20,22   =                         KERNEL    66
    C                                                                       KERNEL    67
    C       .744          1.116          1.488          1.86        2.232   KERNEL    68
    C      2.604          2.976          3.348          3.72        4.092   KERNEL    69
    C      4.464          5.208          5.952          6.696       7.44    KERNEL    70
    C      8.184                                                            KERNEL    71
    C                                                                       KERNEL    72
    C   A(N)  FORN(=1,11  =                                                 KERNEL    73
    C                                                                       KERNEL    74
    C      .24186198       -2.7918027        24.991079       -111.59196     KERNEL    75
    C  271.43549         -305.75288        -41.18363          545.98537     KERNEL    76
    C -644.78155          328.72755        -64.279511                       KERNEL    77
      330 E= EXP (-.372*MU)                                                 KERNEL    78
                                                                            KERNEL    79
          C1 = .138384+K2                                                   KERNEL    80
          C2 = .553536+K2                                                   KERNEL    81
          C3 = 1.245456+K2                                                  KERNEL    82
          C4  = 2.214144 +K2                                                KERNEL    83
          C5  = 3.4596   +K2                                                KERNEL    84
          C6  = 4.981824 +K2                                                KERNEL    85
          C7  = 6.780816 +K2                                                KERNEL    86
          C8  = 8.856576 +K2                                                KERNEL    87
          C9  = 11.209104+K2                                                KERNEL    88
          C10 = 13.8384  +K2                                                KERNEL    89
          C11 = 16.744464+K2                                                KERNEL    90
                                                                            KERNEL    91
          R1  = .24186198 / C1                                              KERNEL    92
          R2  =-2.7918027 / C2                                              KERNEL    93
          R3  = 24.991079 / C3                                              KERNEL    94
          R4  =-111.59196 / C4                                              KERNEL    95
          R5  = 271.43549 / C5                                              KERNEL    96
          R6  =-305.75288 / C6                                              KERNEL    97
          R7  =-41.18363  / C7                                              KERNEL    98
          R8  = 545.98537 / C8                                              KERNEL    99
          R9  =-644.78155 / C9                                              KERNEL   100
          R10 = 328.72755 / C10                                             KERNEL   101
          R11 =-64.279511 / C11                                             KERNEL   102
                                                                            KERNEL   103
          IF  ( ICHUZ .LT. 4 )                          GO TO 340           KERNEL   104
          IOOR = .372*(R1 +2.*R2 + 3.*R3 + 4.*R4 + 5.*R5 + 6.*R6 + 7.*R7 +  KERNEL   105
         1        8.*R8 + 9.*R9 + 10.*R10 + 11.*R11)                        KERNEL   106
          IOOI = -K1*(R1+R2+R3+R4+R5+R6+R7+R8+R9+R10+R11)                   KERNEL   107
                                                                            KERNEL   108
      340 GO TO  (420,350,350,390,350,350,380,350,350),ICHUZ                KERNEL   109
                                                                            KERNEL   110
      350 Q1  = R1/ C1                                                      KERNEL   111
          Q2  = R2/ C2                                                      KERNEL   112
          Q3  = R3/ C3                                                      KERNEL   113
          Q4  = R4/ C4                                                      KERNEL   114
          Q5  = R5/ C5                                                      KERNEL   115
```

```
      Q6  = R6/ C6
      Q7  = R7/ C7
      Q8  = R8/ C8
      Q9  = R9/ C9
      Q10 = R10/C10
      Q11 = R11/C11

      GO TO  (420,410,410,390,360,360,380,360,360),ICHUZ

  360 JOOR =  Q1*(.138384-K2)+Q2*(.553536-K2)+Q3*(1.245456-K2)+Q4*
     1        (2.214144-K2)+Q5*(3.4596-K2)+Q6*(4.981824-K2)+Q7*(6.780816
     2        -K2)+Q8*(8.856576-K2)+Q9*(11.209104-K2)+Q10*(13.8384-K2)+
     3        Q11*(16.744464-K2)
      I2OR3= 2.+K1*IOOI+K2*JOOR

      GO TO  (420,410,410,390,410,390,380,370,370),ICHUZ

  370 JOOI = -K1*(.744*Q1+1.488*Q2+2.232*Q3+2.976*Q4+3.72*Q5+4.464*Q6+
     1            5.208*Q7+5.952*Q8+6.696*Q9+7.44*Q10+8.184*Q11)
      I2OI3= -K1*IOOR+K2*JOOI

      IF  ( ICHUZ .EQ. 8 )              GO TO 500
  380 I1OI = -K1*IOOR
  390 I1OR = 1.+K1*IOOI

  400 GO TO (420,410,410,420,410,410,500,500,500),ICHUZ

  410 JOUR = E*(Q1*(.138384-K2+.372*MU*C1)+
     1       E*(Q2*(.553536-K2+.744*MU*C2)+
     2       E*(Q3*(1.245456-K2+1.116*MU*C3)+
     3       E*(Q4*(2.214144-K2+1.488*MU*C4)+
     4       E*(Q5*(3.4596-K2+1.86*MU*C5)+
     5       E*(Q6*(4.981824-K2+2.232*MU*C6)+
     6       E*(Q7*(6.780816-K2+2.604*MU*C7)+
     7       E*(Q8*(8.856576-K2+2.976*MU*C8)+
     8       E*(Q9*(11.209104-K2+3.348*MU*C9)+
     9       E*(Q10*(13.8384-K2+3.72*MU*C10)+
     A       E*(Q11*(16.744464-K2+4.092*MU*C11)))))))))))

       JOUI = -K1*(E*(Q1*(.744+MU*C1) + E*(Q2*(1.488+MU*C2) +
     1             E*(Q3*(2.232+MU*C3)+ E*(Q4*(2.976+MU*C4) +
     2             E*(Q5*(3.72+MU*C5) + E*(Q6*(4.464+MU*C6) +
     3             E*(Q7*(5.208+MU*C7) + E*(Q8*(5.952+MU*C8) +
     4             E*(Q9*(6.696+MU*C9) + E*(Q10*(7.44+MU*C10) +
     5             E*(Q11*(8.184+MU*C11))))))))))))

  420 IOUR = .372*E*(R1+E*(2.*R2+E*(3.*R3+E*(4.*R4+E*(5.*R5+E*(6.*R6+
     1            E*(7.*R7+E*(8.*R8+E*(9.*R9+E*(10.*R10+E*11.*R11))))))
     2                 ))))

      IOUI = -K1*(E*(R1+E*(R2+E*(R3+E*(R4+E*(R5+E*(R6+E*(R7+E*(R8+E*(R9
     1            +E*(R10+E*R11))))))))))
      R1  = R1S
      C6= K1*MU
      C1= SIN(C6)
      C2= COS(C6)
      C3= SQRT(1.+MU*MU)
```

```
      C4= MU/C3
      C5= C4/(1.+MU*MU)
      GO TO  (430,440,430,430,440,430,500,500,500),ICHUZ
  430 I1UR = C2*(1.-C4+K1*IOUI)-C1*K1*IOUR
      I1UI =-C2*K1*IOUR-C1*(1.-C4+K1*IOUI)
      GO TO  (500,440,440,460,440,440,500,500,500),ICHUZ
  440 I2UR3 = C2*(2.*(1.-C4)-C5+K1*IOUI+K2*JOUR)+C1*(C6*(1.-C4)-K1*IOUR
     1          +K2*JOUI)
      I2UI3 = C2*(C6*(1.-C4)-K1*IOUR+K2*JOUI)-C1*(2.*(1.-C4)-C5+K1*IOUI
     1          +K2*JOUR)
      GO TO  (500,500,500,460,450,450,500,500,500),ICHUZ
  450 I2UR3 = 2.0 * I2OR3 - I2UR3
      IF  ( ICHUZ-6 )                   500,460,500
  460 CAR = 2.*I1OR-I1UR
      I1UR= CAR
  500 DK1R=0.
      R1 = R1S
      DK1I=0.
      DK2R=0.
      DK2I=0.
      C3=K1*MU1
      C1=COS(C3)
      C2=SIN(C3)
      C3= M*R1/BIGR
      C4=SQRT(1.+MU1*MU1)
      C5=KR*XO/BR
      C6=COS(C5)
      C7=SIN(C5)
      GO TO (530,540,530,530,540,530,510,520,510),ICHUZ
  510 I1UR=I1OR
      I1UI=I1OI
      IF  ( ICHUZ-7 )                   520,530,520
  520 I2UR3= I2OR3
      I2UI3= I2OI3
      IF  ( ICHUZ-8 )                   530,540,530
  530 CK1R = I1UR + C3*C1/C4
      CK1I = I1UI - C3*C2/C4
      K1O  = 1.0 + XO/BIGR
      DK1R = CK1R*C6 + CK1I*C7
      DK1I = CK1I*C6 - CK1R*C7
      GO TO  (900,540,540,900,540,540,900,540,540),ICHUZ
  540 C8=  (BETA2*(R1/BIGR)**2 + (2.+MU1*C3)/(C4*C4))*(-C3/C4)
      C9= ( K1*C3)*( C3/C4)
      CK2R = -I2UR3 + C8*C1 - C9*C2
      CK2I = -I2UI3 - C9*C1 - C8*C2
      K2O  = -2.0 -XO*(2.0+BETA2*(R1/BIGR)**2)/BIGR
      DK2R = CK2R*C6 + CK2I*C7
      DK2I = CK2I*C6 - CK2R*C7
  900 KKR = T1*DK1R + T2*DK2R
      KKI = T1*DK1I + T2*DK2I
      K1RT1  = T1 * DK1R
      K1IT1  = T1 * DK1I
      K2RT2P = T2P* DK2R
      K2IT2P = T2P* DK2I
      K1OT1  = K1O* T1
      K2OT2P = K2O* T2P
  905 CONTINUE
```

```
               C                                                                        KERNEL    230
   230         C                                                                        KERNEL    231
                     RETURN                                                             KERNEL    232
                     END                                                                KERNEL    233



      SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS       DEF LINE      REFERENCES
   3  KERNEL           1           231

VARIABLES      SN  TYPE            RELOCATION
  1370  BETA2      REAL                        REFS        50       52      213      217  DEFINED       49
  1371  BIGR       REAL                        REFS        52      195      209      213    2*217
                                            DEFINED        50
     0  BR         REAL               F.P.     REFS        23       51      197  DEFINED        1
  1427  CAR        REAL                        REFS       186  DEFINED      185
  1435  CK1I       REAL                        REFS       210      211  DEFINED      208
  1434  CK1R       REAL                        REFS       210      211  DEFINED      207
  1437  CK2I       REAL                        REFS       218      219  DEFINED      216
  1436  CK2R       REAL                        REFS       218      219  DEFINED      215
  1362  C1         REAL                        REFS        25       26       28       29     2*36       91       110
                                                142       154      175      176      178      180      207       215
                                                216   DEFINED       23       32       79      169      193
  1400  C10        REAL                        REFS       100      119      142      154  DEFINED       88
  1401  C11        REAL                        REFS       101      120      142      154  DEFINED       89
  1363  C2         REAL                        REFS      2*36       92      111      142      154      175       176
                                                178       180      208      215      216  DEFINED       33        80
                                                170       194
  1364  C3         REAL                        REFS      2*36       93      112      142      154      172       193
                                                194       207      208    2*213    2*214  DEFINED       34        81
                                                171       192      195
  1365  C4         REAL                        REFS      2*36       94      113      142      154      173       175
                                                176     2*178    2*180      207      208    3*213      214
                                            DEFINED        35       82      172      196
  1373  C5         REAL                        REFS        95      114      142      154      178      180       198
                                                199   DEFINED       83      173      197
  1374  C6         REAL                        REFS        96      115      142      154      169      170       178
                                                180       210      211      218      219  DEFINED       84       168
                                                198
  1375  C7         REAL                        REFS        97      116      142      154      210      211       218
                                                219   DEFINED       85      199
  1376  C8         REAL                        REFS        98      117      142      154      215      216
                                            DEFINED        86      213
  1377  C9         REAL                        REFS        99      118      142      154      215      216
                                            DEFINED        87      214
  1431  DK1I       REAL                        REFS       221      223  DEFINED      189      211
  1430  DK1R       REAL                        REFS       220      222  DEFINED      187      210
  1433  DK2I       REAL                        REFS       221      225  DEFINED      191      219
  1432  DK2R       REAL                        REFS       220      224  DEFINED      190      218
  1372  E          REAL                        REFS    11*142   11*154   11*161   11*165  DEFINED       77
     0  EPS        REAL               F.P.     REFS        38       44  DEFINED        1
    10  E2         REAL               DLM      REFS         6       37
     0  GAMS       REAL               F.P.     REFS        24       32       33       40       43
```

```
VARIABLES       SN  TYPE           RELOCATION
                                              DEFINED       1
    O  GAMSIG      REAL               F.P.       REFS      24      34      35      40      43
                                              DEFINED       1
 1367  ICHUZ       INTEGER                       REFS      56      58     103     108     122     130     136
                                                  140     174     177     182     184     200     203     206
                                                  212 DEFINED      39      45      48      56      58
 1344  IOUI        REAL                          REFS       2     175     176     178     180
                                              DEFINED     165
 1343  IOUR        REAL                          REFS       2     175     176     178     180
                                              DEFINED     161
 1334  IOOI        REAL                          REFS       2     128     138 DEFINED     106
 1333  IOOR        REAL                          REFS       2     134     137 DEFINED     104
 1350  I1UI        REAL                          REFS       2     208 DEFINED     176     202
 1347  I1UR        REAL                          REFS       2     185     207 DEFINED     175     186     201
 1340  I1OI        REAL                          REFS       2     202 DEFINED     137
 1337  I1OR        REAL                          REFS       2     185     201 DEFINED     138
 1352  I2UI3       REAL                          REFS       2     216 DEFINED     180     205
 1351  I2UR3       REAL                          REFS       2     183     215 DEFINED     178     183     204
 1342  I2OI3       REAL                          REFS       2     205 DEFINED     134
 1341  I2OR3       REAL                          REFS       2     183     204 DEFINED     128
 1346  JOUI        REAL                          REFS       2     178     180 DEFINED     154
 1345  JOUR        REAL                          REFS       2     178     180 DEFINED     142
 1336  JOOI        REAL                          REFS       2     134 DEFINED     132
 1335  JOOR        REAL                          REFS       2     128 DEFINED     124
 1332  KKI         REAL                          REFS       2 DEFINED      21      26     221
 1331  KKR         REAL                          REFS       2 DEFINED      20      25     220
    O  KR          REAL               F.P.       REFS       2      23      51     197 DEFINED       1
 1353  K1          REAL                          REFS       2    2*54     106     128     132     134     137
                                                  138     154     165     168   2*175   2*176   2*178   2*180
                                                  192     214 DEFINED      51
    3  K1IT1       REAL               DLM        REFS       5       6 DEFINED      11      29     223
    2  K1RT1       REAL               DLM        REFS       5       6 DEFINED      10      28     222
    O  K1O         REAL               DLM        REFS       5       6     226 DEFINED       8      27     209
    6  K1OT1       REAL               DLM        REFS       5       6 DEFINED      14      30     226
 1356  K2          REAL                          REFS       2      79      80      81      82      83      84
                                                   85      86      87      88      89  11*124     128     134
                                               11*142   2*178   2*180 DEFINED      54
    5  K2IT2P      REAL               DLM        REFS       5       6 DEFINED      13     225
    4  K2RT2P      REAL               DLM        REFS       5       6 DEFINED      12     224
    1  K2O         REAL               DLM        REFS       5       6     227 DEFINED       9     217
    7  K2OT2P      REAL               DLM        REFS       5       6 DEFINED      15     227
    O  M           REAL               F.P.       REFS       2    2*49      52     195 DEFINED       1
 1355  MU          REAL                          REFS       2      77  11*142  11*154     168   2*171     172
                                                2*173 DEFINED      53
 1354  MU1         REAL                          REFS       2      53      55     192   2*196     213
                                              DEFINED      52
 1357  PI        * REAL                       DEFINED       7
 1414  Q1          REAL                          REFS     124     132     142     154 DEFINED     110
 1425  Q10         REAL                          REFS     124     132     142     154 DEFINED     119
 1426  Q11         REAL                          REFS     124     132     142     154 DEFINED     120
 1415  Q2          REAL                          REFS     124     132     142     154 DEFINED     111
 1416  Q3          REAL                          REFS     124     132     142     154 DEFINED     112
 1417  Q4          REAL                          REFS     124     132     142     154 DEFINED     113
 1420  Q5          REAL                          REFS     124     132     142     154 DEFINED     114
 1421  Q6          REAL                          REFS     124     132     142     154 DEFINED     115
 1422  Q7          REAL                          REFS     124     132     142     154 DEFINED     116
 1423  Q8          REAL                          REFS     124     132     142     154 DEFINED     117
```

```
      MT = MM
      REWIND MT
      NIN = NI
      REWIND NIN
      NOUT = NO
      REWIND NOUT
      MP1 = M + 1
      NN = N
      NEL = NPM
C
C STORE AIC'S ON TEMPORARY UNIT
C
      LTAPES = LTAPE
      LTAPE = IUMEMF
      CALL PUDLAB (8HQUAS  01,LTAPE,NAMES,1,IRDU,JCDU)
C
C - - CALCULATE THE MAXIMUM NO. OF ROWS, 'K'
C
   10 K = (KORE - NEL) / NEL
C
C - - TEST TO SEE IF THE REST OF THE MATRIX WILL FIT IN CORE
C
      LAST = K .GE. NN
      IF( .NOT. LAST ) GO TO 30
      K = NN
      B = 3 + MMAX*2
      C = 2 * (1 + MMAX - KORE )
      KTEMP = ( -B + SQRT(B**2  - 4.0* C )  )  / 2.0
      IF(KTEMP .GE. K)GO TO 30
C
C***   *  WE MUST REDUCE THE FINAL K
C
      K = KTEMP
      LAST = .FALSE.
C
C - - READ 'K' ROWS OF THE AUGMENTED 'A' MATRIX
C
   30 NT = 0
      DO 40 IB = 1, K
      NS = NT + 1
      NT = NT + NEL
      READ (NIN)  (A(IO), IO=NS,NT)
   40 CONTINUE
      NELP1 = NEL + 1
C
C - - CHECK TO SEE IF WE WERE UNLUCKY ENOUGH TO END UP WITH ONLY ONE ROW
C
      IF (K .EQ. 1) GO TO 56
C
C - - 'K' IS GREATER THAN '1' SO WE CAN START THE TRIANGULARIZATION
C
      NS = - NEL
      NELP2 = NELP1 + 1
C
C - - FORM THE 'TRAPEZOIDAL' ARRAY  (8)
C
      DO 50 IB = 2, K
```

```
      SUBROUTINE QUAS(ND,MD,KD,NI,MM,NO,NAT,NW,LTAPE,RHSTAP,NPR1,NFILE) QUAS   2
C  ***   COMPLEX   SOLVIT     QUASI INVERSE                             QUAS   3
C                                                                       QUAS   4
C        ****    ***/  *******  *****  *      ***/        *             QUAS   5
C        *   *  * /*      *      *     *     * /*      ******           QUAS   6
C   **** ****   * / *     *      ***   *     * / *  ****    *  *        QUAS   7
C        *      */  *     *      *     *     */  *          ***         QUAS   8
C        *      /***      *      *     ***** /***           *  *        QUAS   9
C                                                                       QUAS  10
C            D I R E C T   M A T R I X   S O L U T I O N                QUAS  11
C                                                                       QUAS  12
C*** ***LTAPE IS THE TAPE THE L(I,J) MATRIX WILL BE PUT ON              QUAS  13
C*** ***RHSTAP IS THE TAPE THAT THE RIGHT HAND SIDES ARE INPUT ON       QUAS  14
      COMPLEX A(2000), SUM                                              QUAS  15
C                                                                       QUAS  16
      INTEGER RHSTAP                                                    QUAS  17
C                                                                       QUAS  18
      DIMENSION ITAPES(50),IFILES(50)                                   QUAS  19
      DIMENSION DUMMY(4000)                                             QUAS  20
      DIMENSION NAMES(2), NAME(2)                                       QUAS  21
      DIMENSION IOS(98)                                                 QUAS  22
C                                                                       QUAS  23
      COMMON / CTAPES / ITAPES                                          QUAS  24
      COMMON /CFILES/ KFILES,IFILES                                     QUAS  25
      COMMON /PLACES/ IOS                                               QUAS  26
C                                                                       QUAS  27
      LOGICAL JPASS1                                                    QUAS  28
      LOGICAL  LASTRS                                                   QUAS  29
      LOGICAL  LAST                                                     QUAS  30
C                                                                       QUAS  31
      DATA NAMES /4HTEMP,4HAICS/                                        QUAS  32
C                                                                       QUAS  33
      IRDU = 99999                                                      QUAS  34
      JCDU = 99999                                                      QUAS  35
      IUMEMF = IOS(49)                                                  QUAS  36
    1 CONTINUE                                                          QUAS  37
      NATAPE = NAT                                                      QUAS  38
      REWIND NATAPE                                                     QUAS  39
      REWIND NW                                                         QUAS  40
C                                                                       QUAS  41
      ITAPEW = ITAPES(6)                                                QUAS  42
C                                                                       QUAS  43
C                                                                       QUAS  44
      N = ND                                                            QUAS  45
      KORE = KD                                                         QUAS  46
C*** *  RHSTAP = 0 IF THERE ARE NO RHS TO BE PROCESSED THIS RUN         QUAS  47
      IF(RHSTAP .NE. 0 )GO TO 5                                         QUAS  48
      MRHS = 0                                                          QUAS  49
      GO TO 6                                                           QUAS  50
    5 REWIND RHSTAP                                                     QUAS  51
      READ(RHSTAP)MRHS                                                  QUAS  52
    6 M = KORE / N  -  1                                                QUAS  53
      MMAX = MINO(MRHS,M)                                               QUAS  54
      NPM = N + MMAX                                                    QUAS  55
      IF (MAXO(3 * NPM, M * N) .GT. KORE) RETURN                        QUAS  56
      M = 0                                                             QUAS  57
      NPM = N                                                           QUAS  58
```

```
VARIABLES      SN  TYPE           RELOCATION
  227  VY         REAL                            REFS        49   DEFINED       47
  230  VZ         REAL                            REFS        49   DEFINED       48
  231  WW         REAL                            REFS        50   DEFINED       49
    0  XO         REAL                F.P.        REFS         8   DEFINED        1
  170  XOB        REAL                            REFS         9         13   DEFINED        8
    0  YO         REAL                F.P.        REFS        10         14   DEFINED        1
    0  ZO         REAL                F.P.        REFS        11         15   DEFINED        1

EXTERNALS            TYPE   ARGS       REFERENCES
       SQRT       REAL        1 LIBRARY      12         16

INLINE FUNCTIONS   TYPE   ARGS        DEF LINE  REFERENCES
       ABS        REAL        1  INTRIN              28         29         37

STATEMENT LABELS                DEF LINE   REFERENCES
  110  30                          34         30         31
    0  40          INACTIVE        35         34
  114  50                          37        2*34
  121  60                          38         33         36
    0  70          INACTIVE        51

STATISTICS
  PROGRAM LENGTH                   232B      154
        52000B CM USED
```

```
      SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS     DEF LINE     REFERENCES
   3  SNPDF          1          54

VARIABLES     SN  TYPE           RELOCATION
  214  ACAB       REAL                          REFS       30   DEFINED      28
  215  ACBB       REAL                          REFS       31   DEFINED      29
    O  BETA       REAL              F.P.        REFS        8   DEFINED       1
  201  CAB        REAL                          REFS       21        28      32        34   DEFINED      17
  216  CACB       REAL                          REFS       39        40   DEFINED      32        35      37
  204  CAO        REAL                          REFS       44   DEFINED      20
  224  CAOONE     REAL                          REFS       45        46   DEFINED      44
  162  CAVE       REAL                          REFS       50   DEFINED       2
  202  CBB        REAL                          REFS       29        32      34   DEFINED      18
  203  CBI        REAL                          REFS       41   DEFINED      19
    O  CGR        REAL              F.P.        REFS       49   DEFINED       1
    O  CGS        REAL              F.P.        REFS        4         6   DEFINED       1
    O  CL         REAL              F.P.        REFS        3         4   DEFINED       1
  164  CLCGS      REAL                          REFS       17        18      23        40   DEFINED       4
  163  CLSGS      REAL                          REFS       17        18      24        39   DEFINED       3
    O  CV         REAL              F.P.        REFS        2   DEFINED       1
  206  DBX        REAL                          REFS       25        39      40   DEFINED      22
  207  DBY        REAL                          REFS       25        40   DEFINED      23
  210  DBZ        REAL                          REFS       25        39   DEFINED      24
  211  DB2        REAL                          REFS       32   DEFINED      25
    O  DIJ        REAL              F.P.     DEFINED        1        50
  212  DI2        REAL                          REFS       41   DEFINED      26
  213  DO2        REAL                          REFS       44   DEFINED      27
    O  EE         REAL              F.P.        REFS        5         6       7   DEFINED       1
  165  EX         REAL                          REFS        9        13   DEFINED       5
  166  EY         REAL                          REFS       10        14   DEFINED       6
  167  EZ         REAL                          REFS       11        15   DEFINED       7
  2`1  ONECBI     REAL                          REFS       42        43   DEFINED      41
  205  RICAB      REAL                          REFS       22        23      24   DEFINED      21
  174  RIMAG      REAL                          REFS       17        19      21        37   DEFINED      12
  171  RIX        REAL                          REFS       12        17      19        22   DEFINED       9
  172  RIY        REAL                          REFS       12        17      23        26        43
                                             DEFINED       10
  173  RIZ        REAL                          REFS       12        17      24        26        42
                                             DEFINED       11
  200  ROMAG      REAL                          REFS       18        20      37   DEFINED      16
  175  ROX        REAL                          REFS       16        18      20   DEFINED      13
  176  ROY        REAL                          REFS       16        18      27        46   DEFINED      14
  177  ROZ        REAL                          REFS       16        18      27        45   DEFINED      15
    O  SGR        REAL              F.P.        REFS       49   DEFINED       1
    O  SGS        REAL              F.P.        REFS        3         7   DEFINED       1
    O  SL         REAL              F.P.        REFS       17        18      22        39        40
                                             DEFINED        1
    O  TL         REAL              F.P.        REFS        5   DEFINED       1
  217  VBY        REAL                          REFS       47   DEFINED      39
  220  VBZ        REAL                          REFS       48   DEFINED      40
  222  VIY        REAL                          REFS       47   DEFINED      42
  223  VIZ        REAL                          REFS       48   DEFINED      43
  225  VOY        REAL                          REFS       47   DEFINED      45
  226  VOZ        REAL                          REFS       48   DEFINED      46
```

```
      SUBROUTINE SNPDF(SL,CL,TL,SGS,CGS,SGR,CGR,XO,YO,ZO,EE,DIJ,BETA,CV) SNPDF
      CAVE = CV                                                          SNPDF
      CLSGS = CL*SGS                                                     SNPDF
      CLCGS = CL*CGS                                                     SNPDF
      EX =EE*TL                                                          SNPDF
      EY =EE*CGS                                                         SNPDF
      EZ =EE*SGS                                                         SNPDF
      XOB =  XO / BETA                                                   SNPDF
      RIX = XOB+ EX                                                      SNPDF
      RIY = YO + EY                                                      SNPDF
      RIZ = ZO + EZ                                                      SNPDF
      RIMAG = SQRT(RIX**2 + RIY**2 + RIZ**2)                             SNPDF
      ROX = XOB- EX                                                      SNPDF
      ROY = YO - EY                                                      SNPDF
      ROZ = ZO - EZ                                                      SNPDF
      ROMAG = SQRT(ROX**2 + ROY**2 + ROZ**2)                             SNPDF
      CAB = (RIX*SL + RIY*CLCGS + RIZ*CLSGS)/RIMAG                       SNPDF
      CBB = (ROX*SL + ROY*CLCGS + ROZ*CLSGS)/ROMAG                       SNPDF
      CBI = -RIX/RIMAG                                                   SNPDF
      CAO =  ROX/ROMAG                                                   SNPDF
      RICAB = RIMAG*CAB                                                  SNPDF
      DBX = RIX - RICAB*SL                                               SNPDF
      DBY = RIY - RICAB*CLCGS                                            SNPDF
      DBZ = RIZ - RICAB*CLSGS                                            SNPDF
      DB2 = DBX**2 + DBY**2 + DBZ**2                                     SNPDF
      DI2 = RIY**2 + RIZ**2                                              SNPDF
      DO2 = ROY**2 + ROZ**2                                              SNPDF
      ACAB = ABS(CAB)                                                    SNPDF
      ACBB = ABS(CBB)                                                    SNPDF
      IF (ACAB.GT..999) GO TO 30                                         SNPDF
      IF (ACBB.GT..999) GO TO 30                                         SNPDF
      CACB =(CAB - CBB)/DB2                                              SNPDF
      GO TO  60                                                          SNPDF
   30 IF (CAB*CBB)40,50,50                                               SNPDF
   40 CACB = 0.                                                          SNPDF
      GO TO 60                                                           SNPDF
   50 CACB = 0.5*ABS((1./RIMAG**2)-(1./ROMAG**2))                        SNPDF
   60 CONTINUE                                                           SNPDF
      VBY = CACB * (DBX*CLSGS - DBZ*SL)                                  SNPDF
      VBZ = CACB * (DBY*SL - DBX*CLCGS)                                  SNPDF
      ONECBI = (1.0 - CBI)/DI2                                           SNPDF
      VIY = ONECBI*RIZ                                                   SNPDF
      VIZ = -ONECBI*RIY                                                  SNPDF
      CAOONE = (1.0 + CAO)/DO2                                           SNPDF
      VOY = -CAOONE*ROZ                                                  SNPDF
      VOZ = CAOONE*ROY                                                   SNPDF
      VY = VBY + VIY + VOY                                               SNPDF
      VZ = VBZ + VIZ + VOZ                                               SNPDF
      WW= VY*SGR - VZ*CGR                                                SNPDF
      DIJ = WW* CAVE / 25.132741                                         SNPDF
   70 CONTINUE                                                           SNPDF
C                                                                        SNPDF
C                                                                        SNPDF
      RETURN                                                             SNPDF
      END                                                                SNPDF
```

```
STATEMENT LABELS                DEF LINE   REFERENCES
  261  140                          74         65        71
  273  170                          79         43

STATISTICS
  PROGRAM LENGTH                   376B      254
          52000B CM USED
```

```
VARIABLES     SN  TYPE            RELOCATION
  344  DEN3      REAL                          REFS        22        23   DEFINED        15
    O  DIIJI     REAL              F.P.     DEFINED         1        42        78
    O  DIIJR     REAL              F.P.     DEFINED         1        41        77
    O  EE        REAL              F.P.        REFS        11        12        14        15        16        17        18
                                                19         20        21        22        23        25        48        49
                                                57         70        77        78   DEFINED         1
    O  ETAO1     REAL              F.P.        REFS         5         6         7         8        14        15        16
                                                17         18        19        20        21        22        23        48
                                                49         52        53   DEFINED         1
  337  ETAO2     REAL                          REFS        16        17        73   DEFINED         8
    O  E2        REA!              F.P.        REFS         4        11        25        31        32        50        51
                                                52         53        54        55        57        63        64        70
                                              2*73         75        76   DEFINED         1
  336  FACI      REAL                          REFS        40        76   DEFINED         7
  335  FACR      REAL                          REFS        39        75   DEFINED         6
  345  FAC2A     REAL                          REFS        20        21   DEFINED        16
  347  FAC2B     REAL                          REFS        20        21   DEFINED        18
  346  FAC3A     REAL                          REFS        22        23   DEFINED        17
  350  FAC3B     REAL                          REFS        22        23   DEFINED        19
  363  FUNCT     REAL                          REFS        39        40        70   DEFINED        32        37        45
                                                64         69
  334  PARN      REAL                          REFS         6         7   DEFINED         5
    O  R1SQX     REAL              F.P.        REFS         4        11        16        17        18        19        25
                                                54         55        57   DEFINED         1
  360  S         REAL                          REFS      5*30      5*62   DEFINED        29        61
  361  SER       REAL                          REFS        31        63   DEFINED        30        62
  342  TEST      REAL                          REFS        13   DEFINED        12
  357  TESTT     REAL                          REFS        28        60   DEFINED        27        59
  341  TESTO     REAL                          REFS        24   DEFINED        11
  367  TRM1I     REAL                          REFS        42        78   DEFINED        40        55
  366  TRM1R     REAL                          REFS        41        77   DEFINED        39        54
  352  TRM2I     REAL                          REFS        42        78   DEFINED        21        76
  351  TRM2R     REAL                          REFS        41        77   DEFINED        20        75
  354  TRM3I     REAL                          REFS        42   DEFINED        23
  353  TRM3R     REAL                          REFS        41   DEFINED        22
  373  UP1I      REAL                          REFS        55   DEFINED        51
  372  UP1R      REAL                          REFS        54   DEFINED        50
  375  UP2I      REAL                          REFS        55   DEFINED        53
  374  UP2R      REAL                          REFS        54   DEFINED        52
    O  ZETO1     REAL              F.P.        REFS         3         5         9        12        26        32        48
                                                49         58        64   DEFINED         1
  340  ZETO2     REAL                          REFS        14        15        16        17        41        42        70
                                            DEFINED         9

EXTERNALS          TYPE    ARGS       REFERENCES
       ATAN        REAL     1 LIBRARY     36        68

INLINE FUNCTIONS   TYPE    ARGS        DEF LINE  REFERENCES
       ABS         REAL     1  INTRIN                3         11        12        27        59

STATEMENT LABELS              DEF LINE   REFERENCES
  137  90                        34         28
  144  100                       38         33        46
  157  110                       44         24
  161  120                       47         10        13
  243  125                       66         60
```

```
      ARGA = COEF*ZETO1                                                 IDF2      59
      TESTT= ABS(ARGA)                                                  IDF2      60
      IF (TESTT.GT.0.3)  GO TO 125                                      IDF2      61
      S     = ARGA**2                                                   IDF2      62
      SER   = 1./3.+S*(-1./5.+S*(1./7.+S*(-1./9.+S*(1./11.-S/13.))))    IDF2      63
      ALPHA= E2*(COEF**2)*SER                                           IDF2      64
      FUNCT= COEF*(1.0-ALPHA*(ZETO1**2)/E2)                             IDF2      65
      GO TO 140                                                         IDF2      66
  125 CONTINUE                                                          IDF2      67
      ARGT= COEF*AZET                                                   IDF2      68
      ATANA= ATAN(ARGT)                                                 IDF2      69
      FUNCT= ATANA/AZET                                                 IDF2      70
      ALPHA= (E2/ZETO2)*(1.0-FUNCT*(DENO/(2.0*EE)))                     IDF2      71
      GO TO 140                                                         IDF2      72
  130 CONTINUE                                                          IDF2      73
      ALPHA= ((2.0*E2)/(ETAO2-E2))**2                                   IDF2      74
  140 CONTINUE                                                          IDF2      75
      TRM2R= -ALPHA*FACR/E2                                             IDF2      76
      TRM2I= -ALPHA*FACI/E2                                             IDF2      77
      DIIJR= EE*(TRM1R + TRM2R)/DENO                                    IDF2      78
      DIIJI= EE*(TRM1I + TRM2I)/DENO                                    IDF2      79
  170 CONTINUE                                                          IDF2      80
C                                                                       IDF2      81
C                                                                       IDF2      82
      RETURN                                                            IDF2      83
      END                                                               IDF2      84
```

SYMBOLIC REFERENCE MAP (R=3)

```
ENTRY POINTS     DEF LINE     REFERENCES
   3  IDF2           1          82

VARIABLES      SN  TYPE           RELOCATION
  362  ALPHA       REAL                            REFS         32        64        75        76   DEFINED        31        63
                                                     70         73
  356  ARGA        REAL                            REFS         27        29        59        61   DEFINED        26        58
  364  ARGT        REAL                            REFS         36        68   DEFINED        35        67
  365  ATANA       REAL                            REFS         37        69   DEFINED        36        68
    0  AT2         REAL       *UNUSED      F.P.  DEFINED         1
  332  AZET        REAL                            REFS         10        11        35        37        56        67        69
                                                 DEFINED         3
    0  A2I         REAL                    F.P.    REFS          7        21        23        51   DEFINED         1
    0  A2R         REAL                    F.P.    REFS          6        20        22        50   DEFINED         1
    0  B2I         REAL                    F.P.    REFS          7        21        23        53   DEFINED         1
    0  B2R         REAL                    F.P.    REFS          6        20        22        52   DEFINED         1
  355  COEF        REAL                            REFS         26        31        32        35        58        63        64
                                                     67    DEFINED        25        57
    0  C2I         REAL                    F.P.    REFS          7        21        23        51   DEFINED         1
    0  C2R         REAL                    F.P.    REFS          6        20        22        50   DEFINED         1
  370  DENA        REAL                            REFS         54        55   DEFINED        48
  371  DENB        REAL                            REFS         54        55   DEFINED        49
  333  DENO        REAL                            REFS         12        70        77        78   DEFINED         4
  343  DEN2        REAL                            REFS         20        21   DEFINED        14
```

```
      SUBROUTINE IDF2(EE,E2,AT2,ETAO1,ZETO1,A2R,A2I,B2R,B2I,C2R,C2I,     IDF2      2
     1                R1SQX,DIIJR,DIIJI)                                 IDF2      3
      AZET = ABS(ZETO1)                                                  IDF2      4
      DENO = R1SQX-E2                                                    IDF2      5
      PARN = ETAO1**2 + ZETO1**2                                         IDF2      6
      FACR = PARN*A2R + ETAO1*B2R + C2R                                  IDF2      7
      FACI = PARN*A2I + ETAO1*B2I + C2I                                  IDF2      8
      ETAO2=ETAO1**2                                                     IDF2      9
      ZETO2= ZETO1**2                                                    IDF2     10
      IF (AZET.EQ.0.0)  GO TO 120                                        IDF2     11
      TESTO= ABS ( (R1SQX - E2) / (2.0*EE*AZET) )                        IDF2     12
      TEST = ABS(DENO/(2.0*EE*ZETO1))                                    IDF2     13
      IF (TEST.GT.0.1)  GO TO 120                                        IDF2     14
      DEN2 = (ETAO1+EE)**2+ZETO2                                         IDF2     15
      DEN3 = (ETAO1-EE)**2+ZETO2                                         IDF2     16
      FAC2A= R1SQX*ETAO1+(ETAO2-ZETO2)*EE                                IDF2     17
      FAC3A= R1SQX*ETAO1-(ETAO2-ZETO2)*EE                                IDF2     18
      FAC2B= R1SQX+ETAO1*EE                                              IDF2     19
      FAC3B= R1SQX-ETAO1*EE                                              IDF2     20
      TRM2R= (FAC2A*A2R+FAC2B*B2R+(ETAO1+EE)*C2R)/DEN2                   IDF2     21
      TRM2I= (FAC2A*A2I+FAC2B*B2I+(ETAO1+EE)*C2I)/DEN2                   IDF2     22
      TRM3R=-(FAC3A*A2R+FAC3B*B2R+(ETAO1-EE)*C2R)/DEN3                   IDF2     23
      TRM3I=-(FAC3A*A2I+FAC3B*B2I+(ETAO1-EE)*C2I)/DEN3                   IDF2     24
      IF (TESTO.LE.0.0001)  GO TO 110                                    IDF2     25
      COEF = (2.0*EE)/(R1SQX-E2)                                         IDF2     26
      ARGA = COEF*ZETO1                                                  IDF2     27
      TESTT= ABS(ARGA)                                                   IDF2     28
      IF (TESTT.GT.0.3)  GO TO 90                                        IDF2     29
      S    = ARGA**2                                                     IDF2     30
      SER  = 1./3.+S*(-1./5.+S*(1./7.+S*(-1./9.+S*(1./11.-S/13.))))      IDF2     31
      ALPHA= E2*(COEF**2)*SER                                            IDF2     32
      FUNCT= COEF*(1.0-ALPHA*(ZETO1**2)/E2)                              IDF2     33
      GO TO 100                                                          IDF2     34
   90 CONTINUE                                                           IDF2     35
      ARGT = COEF*AZET                                                   IDF2     36
      ATANA= ATAN(ARGT)                                                  IDF2     37
      FUNCT= ATANA/AZET                                                  IDF2     38
  100 CONTINUE                                                           IDF2     39
      TRM1R= FACR*FUNCT                                                  IDF2     40
      TRM1I= FACI*FUNCT                                                  IDF2     41
      DIIJR= (TRM1R + TRM2R + TRM3R)/(2.0*ZETO2)                         IDF2     42
      DIIJI= (TRM1I + TRM2I + TRM3I)/(2.0*ZETO2)                         IDF2     43
      GO TO 170                                                          IDF2     44
  110 CONTINUE                                                           IDF2     45
      FUNCT= 0.0                                                         IDF2     46
      GO TO 100                                                          IDF2     47
  120 CONTINUE                                                           IDF2     48
      DENA = (ETAO1+EE)**2 + ZETO1**2                                    IDF2     49
      DENB = (ETAO1-EE)**2 + ZETO1**2                                    IDF2     50
      UP1R = 2.0*(E2*A2R + C2R)                                          IDF2     51
      UP1I = 2.0*(E2*A2I + C2I)                                          IDF2     52
      UP2R = 4.0*E2*ETAO1*B2R                                            IDF2     53
      UP2I = 4.0*E2*ETAO1*B2I                                            IDF2     54
      TRM1R= (UP1R *(R1SQX+E2) + UP2R )/(DENA*DENB)                      IDF2     55
      TRM1I= (UP1I *(R1SQX+E2) + UP2I )/(DENA*DENB)                      IDF2     56
      IF (AZET.EQ.0.0)  GO TO 130                                        IDF2     57
      COEF = (2.0*EE)/(R1SQX-E2)                                         IDF2     58
```

```
STATISTICS
  PROGRAM LENGTH              201B      129
         52000B CM USED
```

```
VARIABLES      SN  TYPE          RELOCATION
    O  AIM         REAL                F.P.      REFS        5        7       14   DEFINED       1
  174  ALPHA       REAL                          REFS       38  DEFINED       31        37
    O  ARE         REAL                F.P.      REFS        4        6       13   DEFINED       1
  167  ARGA        REAL                          REFS       21       35  DEFINED        20
  171  ARGT        REAL                          REFS       24  DEFINED       23
  157  ARG2        REAL                          REFS       11       12  DEFINED        10
  172  ATANA       REAL                          REFS       25  DEFINED       24
    O  AT2         REAL      *UNUSED   F.P.   DEFINED        1
  164  AZET        REAL                          REFS       16       17       23        25  DEFINED      15
    O  BIM         REAL                F.P.      REFS        5        7  DEFINED         1
    O  BRE         REAL                F.P.      REFS        4        6  DEFINED         1
    O  CIM         REAL                F.P.      REFS        5  DEFINED        1
  166  COEF        REAL                          REFS       20       23       37        38  DEFINED      19
    O  CRE         REAL                F.P.      REFS        4  DEFINED        1
  156  DOWN        REAL                          REFS       10  DEFINED        9
    O  EE          REAL                F.P.      REFS        8        9       13        14       17      19      28
                                              DEFINED        1
    O  ETAO1       REAL                F.P.      REFS        3        4        5         6        7       8       9
                                                   28  DEFINED        1
    O  E2          REAL                F.P.      REFS       17       19       28        31       37      38
                                              DEFINED        1
  152  FACI        REAL                          REFS       41  DEFINED        5
  151  FACR        REAL                          REFS       40  DEFINED        4
  173  FUNCT       REAL                          REFS       40       41  DEFINED        25       28      32      38
  150  PARN        REAL                          REFS        4        5  DEFINED         3
  154  PARNI       REAL                          REFS       12  DEFINED        7
  153  PARNR       REAL                          REFS       11  DEFINED        6
    O  R1SQX       REAL                F.P.      REFS       17       19  DEFINED         1
  175  S           REAL                          REFS     5*36  DEFINED       35
  176  SER         REAL                          REFS       37  DEFINED       36
  170  TEST        REAL                          REFS       22  DEFINED       21
  165  TESTO       REAL                          REFS       18  DEFINED       17
  200  TRM1I       REAL                          REFS       43  DEFINED       41
  177  TRM1R       REAL                          REFS       42  DEFINED       40
  161  TRM2I       REAL                          REFS       43  DEFINED       12
  160  TRM2R       REAL                          REFS       42  DEFINED       11
  163  TRM3I       REAL                          REFS       43  DEFINED       14
  162  TRM3R       REAL                          REFS       42  DEFINED       13
  155  UP          REAL                          REFS       10  DEFINED        8
    O  XIIJI       REAL                F.P.   DEFINED        1       43
    O  XIIJR       REAL                F.P.   DEFINED        1       42
    O  ZETO1       REAL                F.P.      REFS        3        8        9        15       20      31      38
                                              DEFINED        1

EXTERNALS          TYPE    ARGS        REFERENCES
       ALOG        REAL     1 LIBRARY      11       12
       ATAN        REAL     1 LIBRARY      24

INLINE FUNCTIONS   TYPE    ARGS      DEF LINE  REFERENCES
       ABS         REAL     1  INTRIN              15       17       21

STATEMENT LABELS            DEF LINE    REFERENCES
   65  100                     27          16
   72  110                     30          18
   76  120                     34          22
  115  170                     39          26       29       33
```

```
      SUBROUTINE IDF1 (EE,E2,AT2,ETAO1,ZETO1,ARE,AIM,BRE,BIM,CRE,CIM,     IDF1   2
     1                 R1SQX,XIIJR,XIIJI)                                 IDF1   3
      PARN = ETAO1**2 - ZETO1**2                                          IDF1   4
      FACR = PARN*ARE + ETAO1*BRE + CRE                                   IDF1   5
      FACI = PARN*AIM + ETAO1*BIM + CIM                                   IDF1   6
      PARNR= BRE/2.0  + ETAO1*ARE                                         IDF1   7
      PARNI= BIM/2.0  + ETAO1*AIM                                         IDF1   8
      UP   = (ETAO1-EE)**2 + ZETO1**2                                     IDF1   9
      DOWN = (ETAO1+EE)**2 + ZETO1**2                                     IDF1  10
      ARG2 = UP/DOWN                                                      IDF1  11
      TRM2R= PARNR * ALOG(ARG2)                                           IDF1  12
      TRM2I= PARNI * ALOG(ARG2)                                           IDF1  13
      TRM3R= 2.0*EE* ARE                                                  IDF1  14
      TRM3I= 2.0*EE* AIM                                                  IDF1  15
      AZET = ABS(ZETO1)                                                   IDF1  16
      IF (AZET.EQ.0.0)  GO TO 100                                         IDF1  17
      TESTO= ABS((R1SQX-E2)/(2.0*EE*AZET))                                IDF1  18
      IF (TESTO.LE.0.0001)  GO TO 110                                     IDF1  19
      COEF = (2.0*EE)/(R1SQX-E2)                                          IDF1  20
      ARGA = COEF*ZETO1                                                   IDF1  21
      TEST = ABS(ARGA)                                                    IDF1  22
      IF (TEST.LE.0.3)  GO TO 120                                         IDF1  23
      ARGT = COEF*AZET                                                    IDF1  24
      ATANA= ATAN(ARGT)                                                   IDF1  25
      FUNCT= ATANA/AZET                                                   IDF1  26
      GO TO 170                                                           IDF1  27
  100 CONTINUE                                                            IDF1  28
      FUNCT= (2.0*EE)/(ETAO1**2-E2)                                       IDF1  29
      GO TO 170                                                           IDF1  30
  110 CONTINUE                                                            IDF1  31
      ALPHA= E2/ZETO1**2                                                  IDF1  32
      FUNCT= 0.0                                                          IDF1  33
      GO TO 170                                                           IDF1  34
  120 CONTINUE                                                            IDF1  35
      S    = ARGA**2                                                      IDF1  36
      SER  = 1./3.+S*(-1./5.+S*(1./7.+S*(-1./9.+S*(1./11.-S/13.))))       IDF1  37
      ALPHA= E2*(COEF**2)*SER                                             IDF1  38
      FUNCT= COEF*(1.0-ALPHA*(ZETO1**2)/E2)                               IDF1  39
  170 CONTINUE                                                            IDF1  40
      TRM1R= FACR * FUNCT                                                 IDF1  41
      TRM1I= FACI * FUNCT                                                 IDF1  42
      XIIJR= TRM1R + TRM2R + TRM3R                                        IDF1  43
      XIIJI= TRM1I + TRM2I + TRM3I                                        IDF1  44
C                                                                         IDF1  45
C                                                                         IDF1  46
      RETURN                                                              IDF1  47
      END                                                                 IDF1  48
```

SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS	DEF LINE	REFERENCES
3 IDF1	1	46

```
STATEMENT LABELS                DEF LINE   REFERENCES
  144  330                         77         55        57
  273  340                        108        103
  311  350                        110      6*108
  354  360                        124      4*122
  427  370                        132      2*130
  460  380                        137        108       122       130
  462  390                        138        108       122     2*130
    0  400          INACTIVE      140
  502  410                        142      2*122     3*130     4*140
  672  420                        161        108       122       130     2*140
  763  430                        175      4*174
 1011  440                        178      2*174     4*177
 1045  450                        183      2*182
 1051  460                        185        177       182       184
 1054  500                        187        136     3*140     3*174     4*177     6*182     2*184
 1120  510                        201      2*200
 1125  520                        204        200     2*203
 1132  530                        207      4*200       203     2*206
 1165  540                        213      2*200       206     6*212
 1214  900                        220      3*212
 1231  905                        228         22        31

COMMON BLOCKS    LENGTH     MEMBERS - BIAS NAME(LENGTH)
      DLM            9              0 K10    (1)               1 K20    (1)               2 K1RT1  (1)
                                    3 K1IT1  (1)               4 K2RT2P (1)               5 K2IT2P (1)
                                    6 K1OT1  (1)               7 K2OT2P (1)               8 E2     (1)

STATISTICS
  PROGRAM LENGTH                 1440B     800
  CM LABELED COMMON LENGTH         11B       9
          52000B CM USED
```

```
VARIABLES      SN  TYPE            RELOCATION
  1424  Q9         REAL                          REFS      124     132      142      154  DEFINED    118
  1360  R1         REAL                          REFS       17      18     2*50       51       52    104      106
                                                  110      161     165      195      213      217
                                              DEFINED       16      91      167      188
  1361  R1S        REAL                          REFS      167     188  DEFINED       17
  1412  R10        REAL                          REFS      104     106      119      161      165
                                              DEFINED      100
  1413  R11        REAL                          REFS      104     106      120      161      165
                                              DEFINED      101
  1402  R2         REAL                          REFS      104     106      111      161      165
                                              DEFINED       92
  1403  R3         REAL                          REFS      104     106      112      161      165
                                              DEFINED       93
  1404  R4         REAL                          REFS      104     106      113      161      165
                                              DEFINED       94
  1405  R5         REAL                          REFS      104     106      114      161      165
                                              DEFINED       95
  1406  R6         REAL                          REFS      104     106      115      161      165
                                              DEFINED       96
  1407  R7         REAL                          REFS      104     106      116      161      165
                                              DEFINED       97
  1410  R8         REAL                          REFS      104     106      117      161      165
                                              DEFINED       98
  1411  R9         REAL                          REFS      104     106      118      161      165
                                              DEFINED       99
     0  T1         REAL               F.P.       REFS       25      26       28       29       30     44      220
                                                  221      222     223      226  DEFINED        1     24       40
                                                   43       46
     0  T2         REAL               F.P.       REFS       38     220      221  DEFINED        1     37       41
  1366  T2P        REAL                          REFS       37     224      225      227  DEFINED     36
     0  XO         REAL               F.P.       REFS       19      23     2*50       52      197    209      217
                                              DEFINED        1
     0  YO         REAL               F.P.       REFS     2*16    3*36  DEFINED        1
     0  ZO         REAL               F.P.       REFS     2*16    3*36  DEFINED        1

EXTERNALS          TYPE    ARGS        REFERENCES
       COS         REAL       1 LIBRARY     24       25       28       32       34       40       43     170      193
                                           198
       EXP         REAL       1 LIBRARY     77
       SIN         REAL       1 LIBRARY     26       29       33       35      169      194      199
       SQRT        REAL       1 LIBRARY     16       50      171      196

INLINE FUNCTIONS   TYPE    ARGS         DEF LINE  REFERENCES
       ABS         REAL       1  INTRIN                38       44       53

STATEMENT LABELS                  DEF LINE   REFERENCES
     0  100          INACTIVE        19         18
     0  110          INACTIVE        20         19
    23  120                          23       2*19
    52  200                          32       2*18
     0  210          INACTIVE        39         38
   105  220                          43       2*38
     0  230          INACTIVE        45         44
   116  240                          48       2*44
   117  300                          49         42       47
     0  310          INACTIVE        56         55
```

```
      NP = NELP2 - IB
      NS = NS + NELP1
      NT = NS
      DO 50 IO = IB, K
      NT = NT + NEL
      MN = NT
      NB = NS
      A(NT) = A(NT) / A(NS)
      DO 50 NF = 2, NP
      MN = MN + 1
      NB = NB + 1
   50 A(MN) = A(MN) - A(NT) * A(NB)
C*** ***WRITE PART OF THE LMATRIX ON LTAPE   (TRIANGULAR PART)
      CALL PUTROW (LTAPE,2,K,1)
      LBEG =NELP1
      KM1 = K - 1
      DO 55 IB = 1,KM1
      LEND = LBEG + IB- 1
      MAXW = LEND - LBEG + 1
      CALL PUTROW (LTAPE,2,MAXW,1)
      MAXH = 2*MAXW
      CALL PUTROW (LTAPE,2,A(LBEG),MAXH)
   55 LBEG = LBEG + NN
C
C - - WRITE THE 'TRAPEZOIDAL' MATRIX ON TAPE
C
   56 NT = 0
      NP = NEL
      NS = - NEL
      DO 60 IO = 1, K
      NS = NS + NELP1
      NT = NT + NEL
      WRITE (MT) NP, (A(IB), IB = NS, NT)
   60 NP = NP - 1
      IF (LAST) GO TO 90
      NP = NP - M
      NS = KORE - NEL + 1
C
C - - READ ANOTHER ROW
C
      DO 80 IO = 1, NP
      READ (NIN) (A(IB), IB = NS, KORE)
C
C - - MODIFY THIS ROW BY THE 'TRAPEZOIDAL' ARRAY
C
      NT = 1
      MN = NS
      DO 70 IB = 1, K
      NB = NT
      NF = MN + 1
      A(MN) = A(MN) / A(NT)
      DO 65 NN = NF, KORE
      NB = NB + 1
   65 A(NN) = A(NN) - A(MN) * A(NB)
      MN = NF
   70 NT = NT + NELP1
C
```

```
C - - WRITE THE MODIFIED ROW ON TAPE                                    QUAS     173
C                                                                       QUAS     174
C*** ***WRITE REST OF LMATRIX ON LTAPE                                  QUAS     175
      MNM1 = MN - 1                                                     QUAS     176
      MAXW = MNM1 - NS + 1                                              QUAS     177
      CALL PUTROW (LTAPE,2,MAXW,1)                                      QUAS     178
      MAXH = 2*MAXW                                                     QUAS     179
      CALL PUTROW (LTAPE,2,A(NS),MAXH)                                  QUAS     180
      WRITE (NOUT)  (A(NT), NT=MN,KORE)                                 QUAS     181
   80 CONTINUE                                                          QUAS     182
      REWIND NOUT                                                       QUAS     183
      REWIND NIN                                                        QUAS     184
C                                                                       QUAS     185
C - - SWITCH THE TAPES                                                  QUAS     186
C                                                                       QUAS     187
      NT = NIN                                                          QUAS     188
      NIN = NOUT                                                        QUAS     189
      NOUT = NT                                                         QUAS     190
C                                                                       QUAS     191
C - - RE-CALCULATE ROW LENGTH AND LOOP BACK                             QUAS     192
C                                                                       QUAS     193
      NEL = NEL - K                                                     QUAS     194
      NN = NEL - M                                                      QUAS     195
      GO TO 10                                                          QUAS     196
C                                                                       QUAS     197
C - - REWIND ALL TAPES                                                  QUAS     198
C                                                                       QUAS     199
   90 REWIND NIN                                                        QUAS     200
      REWIND NOUT                                                       QUAS     201
C                                                                       QUAS     202
  105 N1 = KORE - K * M + 1                                             QUAS     203
      IFILES(LTAPE) = NFILE                                             QUAS     204
      CALL GEDLAB (8HQUAS  01,LTAPE,NAME,1,IRD,JCD)                     QUAS     205
      P=WIND MT                                                         QUAS     206
C*** ***CALCULATE THE NUMBER OF COLUMNS TO BRING OFF OF THE RHS TAPE    QUAS     207
      MTOTAL = 0                                                        QUAS     208
      M = MMAX                                                          QUAS     209
      IF(M .EQ. 0)GO TO 295                                             QUAS     210
C*** ***MTOTALIS THE TOTAL NUMBER OF RHS COLUMNS ALREADY BROUGHT IN     QUAS     211
  109 MTOTAL = MTOTAL + M                                               QUAS     212
      LASTRS = MTOTAL.GE. MRHS                                          QUAS     213
      MTOTAL = MTOTAL - M                                               QUAS     214
      IF (LASTRS)M = MRHS - MTOTAL                                      QUAS     215
      MTOTAL = MTOTAL + M                                               QUAS     216
C*** ***BRING IN M COLUMNS OF RHS                                       QUAS     217
      KINIT = KORE - (M*N)                                              QUAS     218
      IINIT = KINIT                                                     QUAS     219
      NBEG = KINIT + 1                                                  QUAS     220
      NEND = KINIT+ N                                                   QUAS     221
      DO 110 J =1,M                                                     QUAS     222
      READ (RHSTAP)( A(I),I=NBEG,NEND)                                  QUAS     223
      NBEG = NEND + 1                                                   QUAS     224
  110 NEND = NEND + N                                                   QUAS     225
C*** ***BRING IN L(I,J) MATRIX AND APPLY IT TO RHS                      QUAS     226
      NBEG = 1 + KINIT                                                  QUAS     227
      NEND = 1 + (M-1) * N + KINIT                                      QUAS     228
```

```
C*** ***DO TRIANGULAR SECTION OF LMATRIX
      NLCNT = 0
  111 CONTINUE
      CALL GETROW (LTAPE,1,K,1)
      NLCNT = NLCNT + 1
C*** ***KSUM IS THE TOTAL NUMBER OF L ROWS THAT WILL
C*** ***BE READ AFTER THIS TRIANGULAR SECTION IS FINISHED
      KSUM = KSUM + K
      KM1 = K - 1
C***   ***NOTE THAT KM1 CAN'T BE 0 SINCE K CAN'T BE 1 AND STILL HAVE SOM
C***   ***ON THE LTAPE
      DO 114  I = 1,KM1
      NBEG = NBEG + 1
      NEND = NEND + 1
C*** ***READ 1 ROW OF L(I,J) FROM LTAPE---K-1 TIMES---EACH TIME
C*** ***STARTING WITH L(1)
 1114 CONTINUE
      CALL GETROW (LTAPE,1,MAXW,1)
      MAXH = 2*MAXW
      CALL GETROW (LTAPE,1,A,MAXH)
      JCNT = -1
C*** ***REDUCE THE RHS BY GOING ACROSS A SOLUTION ROW (WHICH
C*** ***ARE NOT IN CONSECUTIVE ORDER, BUT A(1), A(N+1), A(2N+1) ETC.)
      DO 113 NPP = NBEG,NEND,N
      JCNT = JCNT + 1
      SUM = (0.0,0.0)
      NROW = KINIT + ( JCNT * N )
      DO 112 NN=1,I
      NROW = NROW + 1
  112 SUM = SUM + ( A(NN)*A(NROW))
  113 A(NPP) = A(NPP) - SUM
  114 CONTINUE
      IF (KSUM .EQ. N)GO TO 116
C*** ***KSUM = N IF YOU HAVE READ ENTIRE LMATRIX AND
C*** ***THERE IS NO CONSTANT SECTION LEFT
      NTBEG = NBEG
      NTEND = NEND
      KSUMP1 = KSUM + 1
C*** ***READ REST OF LROWS 1 ROW AT A TIME FOR CONSTANT SECTION
      DO 115 I=KSUMP1,N
      NTBEG = NTBEG + 1
      NTEND = NTEND + 1
 1115 CONTINUE
      CALL GETROW (LTAPE,1,MAXW,1)
      MAXH = 2*MAXW
      CALL GETROW (LTAPE,1,A,MAXH)
      JCNT = -1
C*** ***PARTIALLY  REDUCE A RHS ACROSS A RHS ROW BY APPLYING K NUMBER
C*** ***OF L(I,J) S
      DO 124 NPP = NTBEG,NTEND,N
      JCNT = JCNT + 1
      SUM = (0.0,0.0)
      NROW = KINIT + ( JCNT * N )
      DO 123 NN = 1,K
      NROW = NROW + 1
  123 SUM = SUM + ( A(NN) * A(NROW) )
  124 A(NPP) = A(NPP) - SUM
```

```
  115 CONTINUE                                                        QUAS     287
      NBEG = NBEG + 1                                                 QUAS     288
      NEND = NEND + 1                                                 QUAS     289
C*** ***KINIT IS HOW FAR DOWN A COLUMN OF RHS TO START MULTIPLYING BY QUAS     290
C*** ***L(I,J) AT EACH PASS THROUGH                                   QUAS     291
      KINIT = KINIT + K                                               QUAS     292
C*** ***IF KSUMP1 = N THERE ARE NO MORE L(I,J)'S LEFT                 QUAS     293
      IF(KSUMP1 .LT. N)GO TO 111                                      QUAS     294
C*** ***WRITE OUT ALL BUT LAST K ROWS OF RHS IN ROW ORDER ON NATAPE   QUAS     295
  116 B = 4*M + 3                                                     QUAS     296
      C = -2 * KORE                                                   QUAS     297
      K = (    B  +  SQRT( B**2  -4.0*C )  )/2.0                      QUAS     298
      IF(K .GT. ND) K = ND                                            QUAS     299
      KF = K                                                          QUAS     300
      KM1 = K - 1                                                     QUAS     301
      KLEFT = N - KF + IINIT                                          QUAS     302
      INITP1 = IINIT + 1                                              QUAS     303
      NEND = (M-1)*N + IINIT                                          QUAS     304
      DO 117 NPP = INITP1,KLEFT                                       QUAS     305
      NEND = NEND + 1                                                 QUAS     306
  117 WRITE(NATAPE) ( A(J),J=NPP,NEND,N)                              QUAS     307
      REWIND NATAPE                                                   QUAS     308
C*** ***JPASS1 IS TRUE ON 1ST PASS THRU BACK SOLUTION                 QUAS     309
      JPASS1 = .TRUE.                                                 QUAS     310
C                                                                     QUAS     311
C***   ***PUT REMAINING RHS IN CONTIGUOUS LOCATIONS BY COLUMNS        QUAS     312
C***  FROM KORE - (M * KF) + 1  TO  KORE                              QUAS     313
C                                                                     QUAS     314
      NNEW = KORE - KF + 1                                            QUAS     315
      MM1 = M - 1                                                     QUAS     316
C                                                                     QUAS     317
C***   ***IF M = 1, THE ELTS OF THE 1 RHS COLUMN ARE ALREADY IN CONTIGUO QUAS  318
C***   ***LOCATIONS                                                   QUAS     319
C                                                                     QUAS     320
      IF (M.EQ.1)  GO TO 1118                                         QUAS     321
      DO 118 I = 1,MM1                                                QUAS     322
      NOLD = KORE - (I*N) + 1                                         QUAS     323
      DO 118 J = 1,KF                                                 QUAS     324
      NNEW = NNEW - 1                                                 QUAS     325
      NOLD = NOLD - 1                                                 QUAS     326
      A(NNEW) = A(NOLD)                                               QUAS     327
  118 CONTINUE                                                        QUAS     328
 1118 CONTINUE                                                        QUAS     329
C                                                                     QUAS     330
C***   ***NOW NNEW = KORE - (M*KF) + 1                                QUAS     331
C***   ***NOW NOLD = KORE - (M - 1) * N + 1 - KF                      QUAS     332
C   ***   SKIP 1ST PART OF TRAPEZOIDAL MATRIX + READ LAST K ROWS      QUAS     333
C*** ***ATTATCH RHS TO IT SO THAT EVERYTHING IS IN CONSECUTIVE ORDER  QUAS     334
      NREMAN = ND - K                                                 QUAS     335
      IF(NREMAN .EQ. 0)GO TO 126                                      QUAS     336
      DO 122 I = 1,NREMAN                                             QUAS     337
  122 READ(MT) IDUMMY                                                 QUAS     338
  126 NEND = 0                                                        QUAS     339
      KCNT = K                                                        QUAS     340
      NNEW = NNEW - 1                                                 QUAS     341
C***   ***NOTE THAT K = KF WHICH IS ALREADY KNOWN IN CORE             QUAS     342
      DO 121 JCNT = 1,K                                               QUAS     343
```

```
      NBEG = NEND + 1                                                  QUAS    344
      KCNT = KCNT - 1                                                  QUAS    345
      NEND = NBEG + KCNT                                               QUAS    346
      READ(MT)IDUMMY,(A(J),J=NBEG,NEND)                                QUAS    347
      NNEW = NNEW + 1                                                  QUAS    348
      KEND = (MM1 * KF) + NNEW                                         QUAS    349
      DO 121 NPP=NNEW,KEND,KF                                          QUAS    350
      NEND = NEND + 1                                                  QUAS    351
  121 A(NEND) = A(NPP)                                                 QUAS    352
      IFILES(LTAPE) = NFILE                                            QUAS    353
      CALL GEDLAB (8HQUAS  02,LTAPE,NAME,1,IRD,JCD)                    QUAS    354
      REWIND MT                                                        QUAS    355
C                                                                      QUAS    356
C - - THERE, NOW WE CAN START THE BACK-SOLUTION                        QUAS    357
C * * NOTE..THE FIRST AVAILABLE LOCATION FOR THE SOLUTIONS IS A(N1)    QUAS    358
C                                                                      QUAS    359
C                                                                      QUAS    360
C***   ***NL IS THE LAST SUBSCRIPT + 1 OF THE TRAPEZOIDAL A MATRIX THAT QUAS    361
C***   ***CORE                                                         QUAS    362
C                                                                      QUAS    363
      NL = NEND + 1                                                    QUAS    364
      NREM = N                                                         QUAS    365
      NPM = N + M                                                      QUAS    366
      NEL = NPM                                                        QUAS    367
      MP1 = M + 1                                                      QUAS    368
      LAST = K .EQ. N                                                  QUAS    369
      NPASS = 0                                                        QUAS    370
C                                                                      QUAS    371
C - - SOLVE FOR THE ANSWERS CORRESPONDING TO 'K' ROWS                  QUAS    372
C                                                                      QUAS    373
  119 KM1 = K - 1                                                      QUAS    374
      KP1 = K + 1                                                      QUAS    375
      NS = NL - MP1                                                    QUAS    376
      NPASS = NPASS + 1                                                QUAS    377
      DO 130 MN = 1, M                                                 QUAS    378
      NF = NS + MN                                                     QUAS    379
      A(NF) = A(NF) / A(NS)                                            QUAS    380
      NT = NS                                                          QUAS    381
      IF (KM1 .EQ. 0) GO  TO 130                                       QUAS    382
      DO 125 IB = 1, KM1                                               QUAS    383
      NF = NF - IB - M                                                 QUAS    384
      NT = NT - MP1 - IB                                               QUAS    385
      SUM = (0.0,0.0)                                                  QUAS    386
      NP = NF                                                          QUAS    387
      N2 = MP1 + IB                                                    QUAS    388
      DO 120 IO = 1, IB                                                QUAS    389
      NN = NT + IO                                                     QUAS    390
      NP = NP + N2 - IO                                                QUAS    391
  120 SUM = SUM + A(NN) * A(NP)                                        QUAS    392
  125 A(NF) = (A(NF) - SUM) / A(NT)                                    QUAS    393
  130 CONTINUE                                                         QUAS    394
C                                                                      QUAS    395
C - - MOVE THE SOLUTIONS TO CONTIGUOUS LOCATIONS STARTING AT A(N1)     QUAS    396
C                                                                      QUAS    397
      N1 = KORE + 1                                                    QUAS    398
      DO 140 NN = 1, K                                                 QUAS    399
      DO 135 MN = 1, M                                                 QUAS    400
```

```
      NL = NL - 1                                                   QUAS    401
      N1 = N1 - 1                                                   QUAS    402
  135 A(N1) = A(NL)                                                 QUAS    403
  140 NL = NL - NN                                                  QUAS    404
C                                                                   QUAS    405
C - - WRITE THE SOLUTIONS ON TAPE                                   QUAS    406
C                                                                   QUAS    407
      WRITE (NIN) K                                                 QUAS    408
      NS = N1 - 1                                                   QUAS    409
      DO 145 MN = 1, M                                              QUAS    410
      NT = NS + MN                                                  QUAS    411
  145 WRITE ( NIN ) (A(IO), IO = NT, KORE, M)                       QUAS    412
C                                                                   QUAS    413
C - - TEST IF THIS IS THE LAST PASS                                 QUAS    414
C                                                                   QUAS    415
      IF (LAST) GO TO 200                                           QUAS    416
C                                                                   QUAS    417
C - - WE MUST NOW MODIFY THE TRIANGULAR MATRIX TO REFLECT THE EFFECT OF QUAS    418
C     THE SOLUTIONS OBTAINED SO FAR  (EQ 21)                        QUAS    419
C * * NOTE..LOCATIONS A(1) TO A(N1-1) ARE NOW FREE TO USE           QUAS    420
C                                                                   QUAS    421
C - - CALCULATE THE NEXT VALUES OF 'NEL' AND 'NREM'                 QUAS    422
C                                                                   QUAS    423
      NELOLD = NEL                                                  QUAS    424
      KOLD = K                                                      QUAS    425
      NEL = NEL - K                                                 QUAS    426
      NREM = NREM - K                                               QUAS    427
C                                                                   QUAS    428
      NROW = NREM - K + 1                                           QUAS    429
      IF (K .LT. NREM) GO TO 150                                    QUAS    430
      LAST = .TRUE.                                                 QUAS    431
      NROW = 1                                                      QUAS    432
      K = NREM                                                      QUAS    433
  150 NS = 1                                                        QUAS    434
      NT = NELOLD + 1                                               QUAS    435
C                                                                   QUAS    436
C - - READ IN THE ROWS TO BE MODIFIED                               QUAS    437
C                                                                   QUAS    438
      DO 190 IB = 1, NREM                                           QUAS    439
      NT = NT - 1                                                   QUAS    440
      IF (IB .LE. NROW) GO TO 160                                   QUAS    441
      NS = NS + NN                                                  QUAS    442
      NT = NT + NN                                                  QUAS    443
  160 IF (.NOT. JPASS1)GO TO 161                                    QUAS    444
      NBEG = NT - M + 1                                             QUAS    445
C*** ***READ RHS FROM NATAPE                                        QUAS    446
      READ (NATAPE) ( A(IO),IO = NBEG,NT)                           QUAS    447
      NT = NT - M                                                   QUAS    448
  161 READ(MT)NN,(A(IO),IO=NS,NT)                                   QUAS    449
      IF( .NOT. JPASS1 ) GO TO 163                                  QUAS    450
      NT = NT + M                                                   QUAS    451
      NN = NN + M                                                   QUAS    452
  163 NP = N1 - 1                                                   QUAS    453
      NF = NT - M - KM1                                             QUAS    454
      NN = NN - KOLD                                                QUAS    455
      DO 170 MN = 1, M                                              QUAS    456
      N2 = NF                                                       QUAS    457
```

```
      NA = NP + MN                                                      QUAS 458
      NB = NA                                                           QUAS 459
      SUM = (0.0,0.0)                                                   QUAS 460
      DO 165 IO = 1, KOLD                                               QUAS 461
      SUM = SUM + A(N2) * A(NA)                                         QUAS 462
      N2 = N2 + 1                                                       QUAS 463
  165 NA = NA + M                                                       QUAS 464
      N2 = N2 + MN - 1                                                  QUAS 465
  170 A(N2) = A(N2) - SUM                                               QUAS 466
C                                                                       QUAS 467
C - - WRITE THE MODIFIED ROW ON TAPE OR CONDENSE THE ROW                QUAS 468
C                                                                       QUAS 469
      NL = NT - M + 1                                                   QUAS 470
      IF (IB .GE. NROW) GO TO 175                                       QUAS 471
      NF = NL - KP1                                                     QUAS 472
      WRITE (NOUT) NN, (A(IO), IO = NS, NF), (A(IO), IO = NL, NT)       QUAS 473
      GO TO 190                                                         QUAS 474
  175 NF = NL - KOLD                                                    QUAS 475
      DO 180 MN = NL, NT                                                QUAS 476
      A(NF) = A(MN)                                                     QUAS 477
  180 NF = NF + 1                                                       QUAS 478
  190 CONTINUE                                                          QUAS 479
C*** ***IF 1ST TIME THRU BACK SOLN,SWITCH TAPES SO THAT MT WHICH HAS THE QUAS 480
C*** ***ORIGINAL TRAPEZOIDAL MATRIX ON IT BECOME NATAPE AND IS NOT TO   QUAS 481
C*** ***TAPE PART IN ALTERNATING SHRINKING MATRICES.  NATAPE BECOMES MT QUAS 482
C*** ***AND THIS NOW DOES THE ALTERNATING WITH NOUT.                    QUAS 483
      IF( .NOT. JPASS1 ) GO TO 195                                      QUAS 484
      NTEMP = MT                                                        QUAS 485
      MT = NATAPE                                                       QUAS 486
      NATAPE = NTEMP                                                    QUAS 487
      JPASS1= .FALSE.                                                   QUAS 488
      REWIND NATAPE                                                     QUAS 489
  195 REWIND MT                                                         QUAS 490
      REWIND NOUT                                                       QUAS 491
C                                                                       QUAS 492
C - - SWITCH THE TAPES                                                  QUAS 493
C                                                                       QUAS 494
      NT = MT                                                           QUAS 495
      MT = NOUT                                                         QUAS 496
      NOUT = NT                                                         QUAS 497
C                                                                       QUAS 498
C - - LOOP BACK THRU THE SOLUTION                                       QUAS 499
C                                                                       QUAS 500
      NL = NF                                                           QUAS 501
      GO TO 119                                                         QUAS 502
C                                                                       QUAS 503
C - - START TO WRAP IT UP                                               QUAS 504
C                                                                       QUAS 505
  200 REWIND NIN                                                        QUAS 506
      N2 = N                                                            QUAS 507
C                                                                       QUAS 508
C * * NOTE.. AT THIS POINT ALL LOCATIONS A(1) THRU A(KORE) ARE FREE     QUAS 509
C                                                                       QUAS 510
      DO 220 IB = 1, NPASS                                              QUAS 511
      READ (NIN) K                                                      QUAS 512
      N1 = N2 - K + 1                                                   QUAS 513
      NS = N1                                                           QUAS 514
```

```
      NT = N2
C
C - - READ IN THE SOLUTIONS
C
      DO 210 IO = 1, M
      READ (NIN) (A(NN), NN = NS, NT)
      NT = NT + N
  210 NS = NS + N
  220 N2 = N1 - 1
C
C  ---  REWIND ALL INPUT TAPES
      REWIND NIN
      REWIND MT
      REWIND NOUT
C - - WRITE THE SOLUTIONS ON TAPE
C
      NT = 0
      DO 230 IO = 1, M
      NS = NT + 1
      NT = NT + N
      IF (NPR1.EQ.0) GO TO 230
      WRITE (ITAPEW,3) IO
      WRITE (ITAPEW,2) (A(NN), NN = NS, NT)
  230 WRITE (NW) (A(NN), NN = NS, NT)
C   ***   IF TAPE WAS NEVER SWITCHED IT WOULD BE FOOLISH TO SWITCH BACK
      IF(JPASS1)GO TO 290
C
C***   ***SWITCH TAPES
C*** ***BACK SO THAT  MT WILL CONAIN THE TRAPEZOIDAL MATRIX
C*** ***NATAPE WILL HAVE NOTHING USEFUL ON IT.
      NTEMP = NATAPE
      NATAPE = MT
      MT = NTEMP
      REWIND NATAPE
  290 IF( .NOT. LASTRS)GO TO 109
  295 CONTINUE
C
C READ THE TEMPORARY UNIT FOR AIC'S, STORE ON THE PERMANENT UNIT,
C AND ADD THE ADDITIONAL INFORMATION
C
      CALL GEDLAB (8HQUAS  03,LTAPE,NAME,1,IRD,JCD)
      REWIND MT
      KRED = 0
C
      DO 450 I=1,NLCNT
      CALL GETROW (LTAPE,1,KREAD,1)
      CALL PUTROW (LTAPES,2,KREAD,1)
      KRED = KRED + KREAD
      KREAD = KREAD + (N-KRED-1)
      DO 450 LREAD=1,KREAD
      CALL GETROW (LTAPE,1,MAXW,1)
      CALL PUTROW (LTAPES,2,MAXW,1)
      MAXH = 2*MAXW
      CALL GETROW (LTAPE,1,DUMMY,MAXH)
      CALL PUTROW (LTAPES,2,DUMMY,MAXH)
  450 CONTINUE
C
```

```
          DO 500 NROW=1,ND                                               QUAS     572
          READ (MT) ICNT,(A(I),I=1,ICNT)                                 QUAS     573
          MAXW = ICNT                                                    QUAS     574
          CALL PUTROW (LTAPES,2,MAXW,1)                                  QUAS     575
          MAXH = 2*MAXW                                                  QUAS     576
          CALL PUTROW (LTAPES,2,A,MAXH)                                  QUAS     577
      500 CONTINUE                                                       QUAS     578
          LTAPE = LTAPES                                                 QUAS     579
C                                                                        QUAS     580
C   ***   REWIND ALL FILES EXCEPT THE OUTPUT FILE   NW                   QUAS     581
C                                                                        QUAS     582
          REWIND NI                                                      QUAS     583
          REWIND MM                                                      QUAS     584
          REWIND NO                                                      QUAS     585
          REWIND NAT                                                     QUAS     586
          IF( RHSTAP .NE. 0 ) REWIND RHSTAP                              QUAS     587
          MD = MTOTAL                                                    QUAS     588
     9999 CONTINUE                                                       QUAS     589
C                                                                        QUAS     590
C                                                                        QUAS     591
C FORMATS                                                                QUAS     592
C                                                                        QUAS     593
        2 FORMAT (1H0,6E20.8)                                            QUAS     594
        3 FORMAT (1H0, 10HCOLUMN NO.,I6,2X,17HOF GAMMAS FOLLOWS.//)      QUAS     595
C                                                                        QUAS     596
          RETURN                                                         QUAS     597
          END                                                            QUAS     598
```

```
   SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS      DEF LINE      REFERENCES
   3  QUAS              1          55        596

VARIABLES      SN  TYPE          RELOCATION
 2216  A           COMPLEX    ARRAY             REFS        14     2*122   3*126     136      147    2*165   3*168
                                                 179       180       248   2*258     259      274    2*284     285
                                                 306       326       351   2*379   2*391    2*392      402     411
                                               2*461       465     2*472     476     536      537      576
                                             DEFINED        99       122     126     156      165      168     222
                                                 259       285       326     346     351      379      392     402
                                                 446       448       465     476     519      572
 2122  B           REAL                         REFS      2*85     2*297  DEFINED     83      295
 2123  C           REAL                         REFS        85       297  DEFINED     84      296
12056  DUMMY       REAL       ARRAY             REFS        19       567     568
 2156  I           INTEGER                      REFS       222       256     322     572  DEFINED      222     240
                                                 268       321       336     558     572
 2126  IB          INTEGER                      REFS       115       118     132     147      156      383     384
                                                 387       388       440     470  DEFINED       96      114     131
                                                 147       156       162     382     438      510
 2215  ICNT        INTEGER                      REFS       572       573  DEFINED     572
 2176  IDUMMY      INTEGER                   DEFINED       337       346
    1  IFILES      INTEGER    ARRAY   CFILES    REFS        18        24  DEFINED    203      352
```

```
VARIABLES      SN  TYPE           RELOCATION
 2171  INITP1      INTEGER                       REFS       304   DEFINED      302
 2130  IO          INTEGER                       REFS        99       389      390      411      446      448    2*472
                                                  535   DEFINED        99      118      144      155      388      411
                                                  446       448       460    2*472      518      531
    0  IOS         INTEGER     ARRAY    PLACES   REFS        21        25       35
 2146  IRD         INTEGER                       REFS       204       353      554
 2077  IRDU        INTEGER                       REFS        72   DEFINED       33
    0  ITAPES      INTEGER     ARRAY    CTAPES   REFS        18        23       41
 2103  ITAPEW      INTEGER                    DEFINED        41  I/O REFS      535      536
 2101  IUMEMF      INTEGER                       REFS        71   DEFINED       35
 2155  J           INTEGER                       REFS       306       346  DEFINED      221      306      323      346
 2147  JCD         INTEGER                       REFS       204       353      554
 2100  JCDU        INTEGER                       REFS        72   DEFINED       34
 2161  JCNT        INTEGER                       REFS       253       255      279      281  DEFINED      249      253
                                                  275       279       342
 2074  JPASS1      LOGICAL                       REFS        27       443      449      483      539
                                              DEFINED       309       487
 2121  K           INTEGER                       REFS        80        86       96      105      114      118      128
                                                  130       144       162      193      202      232      236      237
                                                  282       291       298      299      300      334      339      342
                                                  368       373       374      398      407      424      425      426
                                                  428       429       512  DEFINED       76       82       90      297
                                                  298       432       511
 2177  KCNT        INTEGER                       REFS       344       345  DEFINED      339      344
    0  KD          INTEGER              F.P.     REFS        45   DEFINED        1
 2200  KEND        INTEGER                       REFS       349   DEFINED      348
 2167  KF          INTEGER                       REFS       301       314      323      348      349
                                              DEFINED       299
    0  KFILES      INTEGER              CFILES   REFS        24
 2151  KINIT       INTEGER                       REFS       218       219      220      226      227      255      281
                                                  291   DEFINED       217      291
 2170  KLEFT       INTEGER                       REFS       304   DEFINED      301
 2140  KMi         INTEGER                       REFS       131       240      381      382      453
                                              DEFINED       130       237      300      373
 2207  KOLD        INTEGER                       REFS       454       460      474  DEFINED      424
 2105  KORE        INTEGER                       REFS        52        55       76       84      151      156      166
                                                  180       202       217      296      314      322      397      411
                                              DEFINED        45
 2204  KP1         INTEGER                       REFS       471   DEFINED      374
 2213  KREAD       INTEGER                       REFS       559       560      561      562      563
                                              DEFINED       562
 2212  KRED        INTEGER                       REFS       561       562  DEFINED      556      561
 2157  KSUM        INTEGER                       REFS       236       261      266  DEFINED      228      236
 2166  KSUMP1      INTEGER                       REFS       268       293  DEFINED      266
 2124  KTEMP       INTEGER                       REFS        86        90  DEFINED       85
 2076  LAST        LOGICAL                       REFS        29        81      149      415  DEFINED       80       91
                                                  368       430
 2075  LASTRS      LOGICAL                       REFS        28       214      548  DEFINED      212
 2137  LBEG        INTEGER                       REFS       132       133      136      137  DEFINED      129      137
 2141  LEND        INTEGER                       REFS       133   DEFINED      132
 2214  LREAD     * INTEGER                    DEFINED       563
    0  LTAPE       INTEGER              F.P.     REFS        70        72      128      134      136      177      179
                                                  203       204       232      246      248      272      274      352
                                                  353       554       559      564      567  DEFINED        1       71
                                                  578
 2120  LTAPES      INTEGER                       REFS       560       565      568      574      576      578
                                              DEFINED        70
```

```
VARIABLES      SN  TYPE          RELOCATION
  2107  M          INTEGER                       REFS        53       55       64      150      194      202      209
                                                  211       213      215      217      221      227      295      303
                                                  315       320      365      367      377      383      399      409
                                                  411       444      447      450      451      453      455      463
                                                  469       518      531  DEFINED       52       56      208      214
  2143  MAXH       INTEGER                       REFS       136      179      248      274      567      568      576
                                              DEFINED       135      178      247      273      566      575
  2142  MAXW       INTEGER                       REFS       134      135      177      178      246      247      272
                                                  273       564      565      566      574      575
                                              DEFINED       133      176      573
     0  MD         INTEGER           F.P.     DEFINED         1      587
     0  MM         INTEGER           F.P.        REFS        58  DEFINED        1 I/O REFS      583
  2110  MMAX       INTEGER                       REFS        54       83       84      208  DEFINED       53
  2173  MM1        INTEGER                       REFS       321      348  DEFINED      315
  2134  MN         INTEGER                       REFS       124    2*126      164    2*165      168      175      180
                                                  378       410      457      464      476  DEFINED      120      124
                                                  161       169      377      399      409      455      475
  2144  MNM1       INTEGER                       REFS       176  DEFINED      175
  2115  MP1        INTEGER                       REFS       375      384      387  DEFINED       64      367
  2106  MRHS       INTEGER                       REFS        53      212      214  DEFINED       48       51
  2112  MT         INTEGER                       REFS       484      494      545  DEFINED       58      485      495
                                                  546  I/O REFS       59      147      205      337      346      354
                                                  448       489      526      555      572
  2150  MTOTAL     INTEGER                       REFS       211      212      213      214      215      587
                                              DEFINED       207      211      213      215
  2104  N          INTEGER                       REFS        52       54       55       57       65      217      220
                                                  224       227      252      255      261      268      278      281
                                                  293       301      303      306      322      364      365      368
                                                  506       520      521      533      562  DEFINED       44
  2210  NA         INTEGER                       REFS       458      461      463  DEFINED      457      463
 21720  NAME       INTEGER  ARRAY                REFS        20      204      353      554
 21716  NAMES      INTEGER  ARRAY                REFS        20       72  DEFINED       31
     0  NAT        INTEGER           F.P.        REFS        37  DEFINED        1 I/O REFS      585
  2102  NATAPE     INTEGER                       REFS       485      544  DEFINED       37      486      545
                                             I/O REFS        38      306      307      446      488      547
  2135  NB         INTEGER                       REFS       125      126      167      168  DEFINED      121      125
                                                  163       167      458
  2153  NBEG       INTEGER                       REFS       222      241      252      264      287      345      346
                                                  446   DEFINED      219      223      226      241      287      343
                                                  444
     0  ND         INTEGER           F.P.        REFS        44    2*298      334      571  DEFINED        1
  2117  NEL        INTEGER                       REFS      2*76       98      101      109      119      142      143
                                                  146       151      193      194      423      425
                                              DEFINED        66      193      366      425
  2206  NELOLD     INTEGER                       REFS       434  DEFINED      423
  2131  NELP1      INTEGER                       REFS       110      116      129      145      170
                                              DEFINED       101
  2132  NELP2      INTEGER                       REFS       115  DEFINED      110
  2154  NEND       INTEGER                       REFS       222      223      224      242      252      265      288
                                                  305       306      343      346      350      351      363
                                              DEFINED       220      224      227      242      288      303      305
                                                  338       345      350
  2136  NF         INTEGER                       REFS       166      169    2*379      383      386    2*392      456
                                                  472       476      477      500  DEFINED      123      164      378
                                                  383       453      471      474      477
     0  NFILE      INTEGER           F.P.        REFS       203      352  DEFINED        1
     0  NI         INTEGER           F.P.        REFS        60  DEFINED        1 I/O REFS      582
```

```
VARIABLES     SN   TYPE            RELOCATION
 2113  NIN         INTEGER                          REFS       187   DEFINED       60       188   I/O REFS       61        99
                                                     156       183       199      407       411       505      511       519
                                                     525
 2201  NL          INTEGER                          REFS       375       400      402       403       471      472       474
                                                     475   DEFINED       363      400       403       469      500
 2160  NLCNT       INTEGER                          REFS       233       558  DEFINED       230       233
 2116  NN          INTEGER                          REFS        80        82      137     2*168       258      284       391
                                                     403       441       442      451       454       472      519       536
                                                     537   DEFINED        65      166       194       256      282       389
                                                     398       448       451      454       519       536      537
 2172  NNEW        INTEGER                          REFS       324       326      340       347       348      349
                                                 DEFINED       314       324      340       347
    O  NO          INTEGER            F.P.          REFS        62   DEFINED        1   I/O REFS      584
 2174  NOLD        INTEGER                          REFS       325       326  DEFINED       322       325
 2114  NOUT        INTEGER                          REFS       188       495  DEFINED        62       189      496
                                                I/O REFS        63       180      182       200       472      490       527
 2133  NP          INTEGER                          REFS       123       147      148       150       155      390       391
                                                     457   DEFINED       115      142       148       150      386       390
                                                     452
 2203  NPASS       INTEGER                          REFS       376       510  DEFINED       369       376
 2111  NPM         INTEGER                          REFS        55        66      366   DEFINED        54       57       365
 2162  NPP         INTEGER                          REFS     2*259     2*285      306       351   DEFINED      252       278
                                                     304       349
    O  NPR1        INTEGER            F.P.          REFS       534   DEFINED        1
 2202  NREM        INTEGER                          REFS       426       428      429       432       438
                                                 DEFINED       364       426
 2175  NREMAN      INTEGER                          REFS       335       336  DEFINED       334
 2163  NROW        INTEGER                          REFS       257       258      283       284       440      470
                                                 DEFINED       255       257      281       283       428      431       571
 2127  NS          INTEGER                          REFS        99       116      117       121       122      145       147
                                                     156       161       176      179       378       379      380       410
                                                     441       448       472      519       521       536      537
                                                 DEFINED        97       109      116       143       145      151       375
                                                     408       433       441      513       521       532
 2125  NT          INTEGER                          REFS        97        98       99       119       120    2*122       126
                                                     146       147       163      165       170       180      189       384
                                                     389       392       411      439       442       444      446       447
                                                     448       450       453      469       472       475      496       519
                                                     520       532       533      536       537   DEFINED       95        98
                                                     117       119       141      146       160       170      180       187
                                                     380       384       410      434       439       442      447       450
                                                     494       514       520      530       533
 2164  NTBEG       INTEGER                          REFS       269       278  DEFINED       264       269
 2211  NTEMP       INTEGER                          REFS       486       546  DEFINED       484       544
 2165  NTEND       INTEGER                          REFS       270       278  DEFINED       265       270
    O  NW          INTEGER            F.P.       DEFINED         1  I/O REFS       39       537
 2145  N1          INTEGER                          REFS       401       402      408       452       513      522
                                                 DEFINED       202       397      401       512
 2205  N2          INTEGER                          REFS       390       461      462       464     2*465      512       514
                                                 DEFINED       387       456      462       464       506      522
    O  RHSTAP      INTEGER            F.P.          REFS        16        47      586   DEFINED         1
                                                I/O REFS        50        51      222       586
 2072  SUM         COMPLEX                          REFS        14       258      259       284       285      391       392
                                                     461       465   DEFINED      254       258       280      284       385
                                                     391       459       461
       VARIABLES USED AS FILE NAMES, SEE ABOVE
```

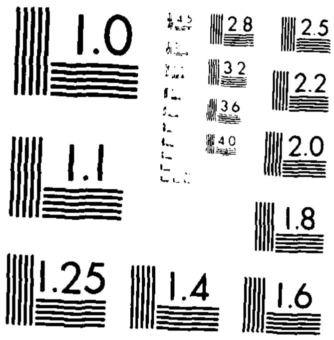
```
EXTERNALS          TYPE    ARGS        REFERENCES
       GEDLAB                6             204       353       554
       GETROW                4             232       246       248       272       274       559       564       567
       PUDLAB                6              72
       PUTROW                4             128       134       136       177       179       560       565       568       574
                                           576
       SQRT       REAL       1 LIBRARY      85       297

INLINE FUNCTIONS   TYPE    ARGS         DEF LINE  REFERENCES
       MAXO       INTEGER    0  INTRIN                 55
       MINO       INTEGER    0  INTRIN                 53

STATEMENT LABELS                DEF LINE    REFERENCES
     0  1         INACTIVE         36
  2054  2      FMT                593         536
  2057  3      FMT                594         535
    25  5                          50          47
    31  6                          52          49
    71  10                         76         195
   115  30                         95          81        86
     0  40                        100          96
     0  50                        126         114       118       123
     0  55                        137         131
   234  56                        141         105
     0  60                        148         144
     0  65                        168         166
     0  70                        170         162
     0  80                        181         155
   373  90                        199         149
     0  105       INACTIVE        202
   414  109                       211         548
     0  110                       224         221
   4!2  111                       231         293
     0  112                       258         256
     0  113                       259         252
     0  114                       260         240
     0  115                       286         268
   617  116                       295         261
     0  117                       306         304
     0  118                       327         321       323
  1005  119                       373         501
     0  120                       391         388
     0  121                       351         342       349
     0  122                       337         336
     0  123                       284         282
     0  124                       285         278
     0  125                       392         382
   725  126                       338         335
  1075  130                       393         377       381
     0  135                       402         399
     0  140                       403         398
     0  145                       411         409
  1161  150                       433         429
  1172  160                       443         440
  1205  161                       448         443
  1220  163                       452         449
     0  165                       463         460
```

STATEMENT	LABELS		DEF LINE	REFERENCES	
0	170		465	455	
1307	175		474	470	
0	180		477	475	
1323	190		478	438	473
1334	195		489	483	
1345	200		505	415	
0	210		521	518	
0	220		522	510	
1426	230		537	531	534
1445	290		548	539	
1446	295		549	209	
0	450		569	558	563
0	500		577	571	
0	1114	INACTIVE	245		
0	1115	INACTIVE	271		
714	1118		328	320	
0	9999	INACTIVE	588		

LOOPS	LABEL	INDEX	FROM-TO	LENGTH	PROPERTIES		
117	40	IB	96 100	14B		EXT REFS	
140	50	IB	114 126	46B		NOT INNER	
145	50	IO	118 126	36B		NOT INNER	
167	50	NF	123 126	11B	OPT		
214	55	IB	131 137	20B		EXT REFS	
240	60	IO	144 148	15B		EXT REFS	
263	80	IO	155 181	77B		EXT REFS	NOT INNER
275	70	IB	162 170	37B		NOT INNER	
316	65	NN	166 169	10B	OPT		
430	110	J	221 224	15B		EXT REFS	
462	114	I	240 260	50B		EXT REFS	NOT INNER
475	113	NPP	252 259	32B		NOT INNER	
507	112	NN	256 258	10B	OPT		
540	115	I	268 286	50B		EXT REFS	NOT INNER
553	124	NPP	278 285	32B		NOT INNER	
565	123	NN	282 284	10B	OPT		
643	117	NPP	304 306	20B		EXT REFS	NOT INNER
650		J	306 306	7B		EXT REFS	
672	118	I	321 327	22B		NOT INNER	
703	118	J	323 327	6B	INSTACK		
720	122	I	336 337	5B		EXT REFS	
732	121	JCNT	342 351	33B		EXT REFS	NOT INNER
755	121	NPP	349 351	5B	INSTACK		
1013	130	MN	377 393	65B		NOT INNER	
1027	125	IB	382 392	46B		NOT INNER	
1043	120	IO	388 391	14B	OPT		
1102	140	NN	398 403	20B		NOT INNER	
1110	135	MN	399 402	6B	INSTACK		
1127	145	MN	409 411	21B		EXT REFS	NOT INNER
1135		IO	411 411	7B		EXT REFS	
1164	190	IB	438 478	142B		EXT REFS	NOT INNER
1227	170	MN	455 465	40B		NOT INNER	
1243	165	IO	460 463	12B	OPT		
1316	180	MN	475 477	4B	INSTACK		
1352	220	IB	510 522	30B		EXT REFS	NOT INNER
1361	210	IO	518 521	14B		EXT REFS	
1411	230	IO	531 537	27B		EXT REFS	
1455	450	I	553 569	31B		EXT REFS	NOT INNER

AD-A152 270 ESP (EXTERNAL-STORES PROGRAM) - A PILOT COMPUTER 8/8
PROGRAM FOR DETERMINING..(U) GRUMMAN AEROSPACE CORP
BETHPAGE NY J B SMEDFJELD FEB 85 ADCR-85-1-VOL-3-PT-1
UNCLASSIFIED N00019-81-C-0395 F/G 9/2 NL

END
FILMED
DTIC



MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS 1963-A

```
LOOPS  LABEL   INDEX    FROM-TO   LENGTH   PROPERTIES
 1466  450     LREAD    563 569     16B             EXT REFS
 1507  500     NROW     571 577     20B             EXT REFS

COMMON BLOCKS   LENGTH    MEMBERS - BIAS NAME(LENGTH)
       CTAPES       50              0 ITAPES (50)
       CFILES       51              0 KFILES (1)             1 IFILES (50)
       PLACES       98              0 IOS    (98)

STATISTICS
  PROGRAM LENGTH              21750B    9192
  CM LABELED COMMON LENGTH      307B     199
        52000B CM USED
```

```
      SUBROUTINE FUTSOL(ND,MD,KD,NI,MM,NO,NAT,NW,LTAPE,LFILE,RHSTAP,      FUTSOL   2
     1NPR1)                                                               FUTSOL   3
C                                                                         FUTSOL   4
C  ***   THIS IS THE COMPLEX VERSION OF FUTSOL                            FUTSOL   5
C                                                                         FUTSOL   6
C                                                                         FUTSOL   7
C                                                                         FUTSOL   8
C         ****   ***/  *******  *****  *      ***/        *               FUTSOL   9
C         *   *  * /*     *     *      *      * /*      ******            FUTSOL  10
C    **** ****   * / *    *     ***    *      * / * ****    *  *          FUTSOL  11
C         *      */  *    *     *      *      */  *        ***            FUTSOL  12
C         *      /***     *     *      *****  /***          *  *          FUTSOL  13
C                                                                         FUTSOL  14
C             D I R E C T   M A T R I X   S O L U T I O N                 FUTSOL  15
C                                                                         FUTSOL  16
C     WRITTEN BY J. L. HESS * PROGRAMMED BY C. D. SCHOOR                  FUTSOL  17
C*** ***LTAPE IS THE TAPE THE L(I,J) MATRIX WILL BE PUT ON                FUTSOL  18
C*** ***RHSTAP IS THE TAPE THAT THE RIGHT HAND SIDES ARE INPUT ON         FUTSOL  19
      INTEGER RHSTAP                                                      FUTSOL  20
C                                                                         FUTSOL  21
      DIMENSION ITAPES(50),IFILES(50)                                     FUTSOL  22
C                                                                         FUTSOL  23
      COMMON / CTAPES / ITAPES                                            FUTSOL  24
      COMMON / CFILES / KFILES, IFILES                                    FUTSOL  25
C                                                                         FUTSOL  26
      DIMENSION NAME(2)                                                   FUTSOL  27
      DIMENSION DUMMY(4000)                                               FUTSOL  28
C                                                                         FUTSOL  29
      COMPLEX A(2000), SUM                                                FUTSOL  30
C                                                                         FUTSOL  31
      LOGICAL JPASS1                                                      FUTSOL  32
      LOGICAL  LASTRS                                                     FUTSOL  33
      LOGICAL  LAST                                                       FUTSOL  34
C                                                                         FUTSOL  35
    1 CONTINUE                                                            FUTSOL  36
      NATAPE = NAT                                                        FUTSOL  37
      REWIND NATAPE                                                       FUTSOL  38
      REWIND NW                                                           FUTSOL  39
C                                                                         FUTSOL  40
C                                                                         FUTSOL  41
      ITAPEW = ITAPES(6)                                                  FUTSOL  42
C                                                                         FUTSOL  43
C                                                                         FUTSOL  44
      N = ND                                                              FUTSOL  45
      KORE = KD                                                           FUTSOL  46
C*** *  RHSTAP = O IF THERE ARE NO RHS TO BE PROCESSED THIS RUN           FUTSOL  47
      IF(RHSTAP .NE. O )GO TO 5                                           FUTSOL  48
      MRHS = O                                                            FUTSOL  49
      GO TO 6                                                             FUTSOL  50
    5 REWIND RHSTAP                                                       FUTSOL  51
      READ(RHSTAP)MRHS                                                    FUTSOL  52
    6 M = KORE/N -1                                                       FUTSOL  53
      MMAX = MINO(MRHS,M)                                                 FUTSOL  54
      NPM = N + MMAX                                                      FUTSOL  55
      IF (MAXO(3 * NPM, M * N) .GT. KORE) RETURN                          FUTSOL  56
      M = O                                                               FUTSOL  57
```

```
      MT = MM                                                          FUTSOL    59
      REWIND MT                                                        FUTSOL    60
      NIN = NI                                                         FUTSOL    61
      REWIND NIN                                                       FUTSOL    62
      NOUT = NO                                                        FUTSOL    63
      REWIND NOUT                                                      FUTSOL    64
      NN = N                                                           FUTSOL    65
      NEL = NPM                                                        FUTSOL    66
C                                                                      FUTSOL    67
C - - CALCULATE THE MAXIMUM NO. OF ROWS, 'K'                            FUTSOL    68
C                                                                      FUTSOL    69
C*** ***CALCULATE THE NUMBER OF COLUMNS TO BRING OFF OF THE RHS TAPE   FUTSOL    70
      MTOTAL = 0                                                       FUTSOL    71
      M = MMAX                                                         FUTSOL    72
      IF(M .EQ. 0)GO TO 295                                            FUTSOL    73
C*** ***MTOTALIS THE TOTAL NUMBER OF RHS COLUMNS ALREADY BROUGHT IN     FUTSOL    74
  109 MTOTAL = MTOTAL + M                                              FUTSOL    75
      LASTRS = MTOTAL.GE. MRHS                                         FUTSOL    76
      MTOTAL = MTOTAL - M                                              FUTSOL    77
      IF (LASTRS)M = MRHS - MTOTAL                                     FUTSOL    78
      MP1 = M + 1                                                      FUTSOL    79
      MM1 = M - 1                                                      FUTSOL    80
      MTOTAL = MTOTAL + M                                              FUTSOL    81
C*** ***BRING IN M COLUMNS OF RHS                                      FUTSOL    82
      KINIT = KORE - (M*N)                                             FUTSOL    83
      IINIT = KINIT                                                    FUTSOL    84
      NBEG = KINIT + 1                                                 FUTSOL    85
      NEND = KINIT+ N                                                  FUTSOL    86
      DO 110 J =1,M                                                    FUTSOL    87
      READ (RHSTAP)( A(I),I=NBEG,NEND)                                 FUTSOL    88
      NBEG = NEND + 1                                                  FUTSOL    89
  110 NEND = NEND + N                                                  FUTSOL    90
C*** ***BRING IN L(I,J) MATRIX AND APPLY IT TO RHS                     FUTSOL    91
      NBEG = 1 + KINIT                                                 FUTSOL    92
      NEND = 1 + (M-1) * N + KINIT                                     FUTSOL    93
      KSUM = 0                                                         FUTSOL    94
      NLCNT = 0                                                        FUTSOL    95
C*** ***DO TRIANGULAR SECTION OF LMATRIX                               FUTSOL    96
  111 CONTINUE                                                         FUTSOL    97
      CALL GETROW (LTAPE,1,K,1)                                        FUTSOL    98
      NLCNT = NLCNT + 1                                                FUTSOL    99
C*** ***KSUM IS THE TOTAL NUMBER OF L ROWS THAT WILL                   FUTSOL   100
C*** ***BE READ AFTER THIS TRIANGULAR SECTION IS FINISHED              FUTSOL   101
      KSUM = KSUM + K                                                  FUTSOL   102
      KM1 = K - 1                                                      FUTSOL   103
C***   ***NOTE THAT KM1 CAN'T BE 0 SINCE K CAN'T BE 1 AND STILL HAVE SOM FUTSOL   104
C***   ***ON THE LTAPE                                                FUTSOL   105
      DO 114  I = 1,KM1                                                FUTSOL   106
      NBEG = NBEG + 1                                                  FUTSOL   107
      NEND = NEND + 1                                                  FUTSOL   108
C*** ***READ 1 ROW OF L(I,J) FROM LTAPE---K-1 TIMES---EACH TIME        FUTSOL   109
C*** ***STARTING WITH L(1)                                             FUTSOL   110
      CALL GETROW (LTAPE,1,MAXW,1)                                     FUTSOL   111
      MAXH = 2*MAXW                                                    FUTSOL   112
      CALL GETROW (LTAPE,1,A,MAXH)                                     FUTSOL   113
      JCNT = -1                                                        FUTSOL   114
C*** ***REDUCE THE RHS BY GOING ACROSS A SOLUTION ROW (WHICH           FUTSOL   115
```

```
C*** ***ARE NOT IN CONSECUTIVE ORDER, BUT A(1), A(N+1), A(2N+1) ETC.)
      DO 113 NPP = NBEG,NEND,N
      JCNT = JCNT + 1
      SUM = (0.0,0.0)
      NROW = KINIT + ( JCNT * N )
      DO 112 NN=1,I
      NROW = NROW + 1
  112 SUM = SUM + ( A(NN)*A(NROW))
  113 A(NPP) = A(NPP) - SUM
  114 CONTINUE
      IF (KSUM .EQ. N)GO TO 116
C*** ***KSUM = N IF YOU HAVE READ ENTIRE LMATRIX AND
C*** ***THERE IS NO CONSTANT SECTION LEFT
      NTBEG = NBEG
      NTEND = NEND
      KSUMP1 = KSUM + 1
C*** ***READ REST OF LROWS 1 ROW AT A TIME FOR CONSTANT SECTION
      DO 115 I=KSUMP1,N
      NTBEG = NTBEG + 1
      NTEND = NTEND + 1
      CALL GETROW (LTAPE,1,MAXW,1)
      MAXH = 2*MAXW
      CALL GETROW (LTAPE,1,A,MAXH)
      JCNT = -1
C*** ***PARTIALLY  REDUCE A RHS ACROSS A RHS ROW BY APPLYING K NUMBER
C*** ***OF L(I,J) S
      DO 124 NPP = NTBEG,NTEND,N
      JCNT = JCNT + 1
      SUM = (0.0,0.0)
      NROW = KINIT + ( JCNT * N )
      DO 123 NN = 1,K
      NROW = NROW + 1
  123 SUM = SUM + ( A(NN) * A(NROW) )
  124 A(NPP) = A(NPP) - SUM
  115 CONTINUE
      NBEG = NBEG + 1
      NEND = NEND + 1
C*** ***KINIT IS HOW FAR DOWN A COLUMN OF RHS TO START MULTIPLYING BY
C*** ***L(I,J) AT EACH PASS THROUGH
      KINIT = KINIT + K
C*** ***IF KSUMP1 = N THERE ARE NO MORE L(I,J)'S LEFT
      IF(KSUMP1 .LT. N)GO TO 111
C*** ***WRITE OUT ALL BUT LAST K ROWS OF RHS IN ROW ORDER ON NATAPE
  116 B = 4*M + 3
      C = -2 * KORE
      K = (  -B  +  SQRT( B**2  -4.0*C )  )/2.0
      IF(K .GT. ND) K = ND
      KF = K
      KM1 = K - 1
      KLEFT = N - KF + IINIT
      INITP1 = IINIT + 1
      NEND = (M-1)*N + IINIT
      DO 117 NPP = INITP1,KLEFT
      NEND = NEND + 1
  117 WRITE(NATAPE) ( A(J),J=NPP,NEND,N)
      REWIND NATAPE
C*** ***JPASS1 IS TRUE ON 1ST PASS THRU BACK SOLUTION
```

```
      JPASS1 = .TRUE.                                                   FUTSOL    173
C                                                                       FUTSOL    174
C***    ***PUT REMAINING RHS IN CONTIGUOUS LOCATIONS BY COLUMNS         FUTSOL    175
C***  FROM KORE - (M * KF) + 1  TO  KORE                                FUTSOL    176
C                                                                       FUTSOL    177
      NNEW = KORE - KF + 1                                              FUTSOL    178
C                                                                       FUTSOL    179
C***    ***IF M = 1, THE ELTS OF THE 1 RHS COLUMN ARE ALREADY IN CONTIGUO FUTSOL  180
C***    ***LOCATIONS                                                    FUTSOL    181
C                                                                       FUTSOL    182
      IF (M.EQ.1)  GO TO 1118                                           FUTSOL    183
      DO 118 I = 1,MM1                                                  FUTSOL    184
      NOLD = KORE - (I*N) + 1                                           FUTSOL    185
      DO 118 J = 1,KF                                                   FUTSOL    186
      NNEW = NNEW - 1                                                   FUTSOL    187
      NOLD = NOLD - 1                                                   FUTSOL    188
      A(NNEW) = A(NOLD)                                                 FUTSOL    189
  118 CONTINUE                                                          FUTSOL    190
 1118 CONTINUE                                                          FUTSOL    191
C                                                                       FUTSOL    192
C***    ***NOW NNEW = KORE - (M*KF) + 1                                 FUTSOL    193
C***    ***NOW NOLD = KORE - (M - 1) * N + 1 - KF                       FUTSOL    194
C  **    SKIP 1ST PART OF TRAPEZOIDAL MATRIX ON LTAPE                   FUTSOL    195
C  **    READ IN LAST K ROWS OF TRAPEZOIDAL MATRIX AND                  FUTSOL    196
C*** ***ATTATCH RHS TO IT SO THAT EVERYTHING IS IN CONSECUTIVE ORDER    FUTSOL    197
      NREMAN = ND - K                                                   FUTSOL    198
      IF( NREMAN .EQ. 0 )GO TO 126                                      FUTSOL    199
      DO 122 I=1,NREMAN                                                 FUTSOL    200
      CALL GETROW (LTAPE,1,MAXW,1)                                      FUTSOL    201
      MAXH = 2*MAXW                                                     FUTSOL    202
      CALL GETROW (LTAPE,1,DUMMY,MAXH)                                  FUTSOL    203
  122 CONTINUE                                                          FUTSOL    204
  126 NEND = 0                                                          FUTSOL    205
      KCNT = K                                                          FUTSOL    206
      NNEW = NNEW - 1                                                   FUTSOL    207
C***    ***NOTE THAT K = KF WHICH IS ALREADY KNOWN IN CORE              FUTSOL    208
      DO 121 JCNT = 1,K                                                 FUTSOL    209
      NBEG = NEND + 1                                                   FUTSOL    210
      KCNT = KCNT - 1                                                   FUTSOL    211
      NEND = NBEG + KCNT                                                FUTSOL    212
      CALL GETROW (LTAPE,1,MAXW,1)                                      FUTSOL    213
      MAXH = 2*MAXW                                                     FUTSOL    214
      CALL GETROW (LTAPE,1,A(NBEG),MAXH)                                FUTSOL    215
      NNEW = NNEW + 1                                                   FUTSOL    216
      KEND = (MM1 * KF) + NNEW                                          FUTSOL    217
      DO 121 NPP=NNEW,KEND,KF                                           FUTSOL    218
      NEND = NEND + 1                                                   FUTSOL    219
  121 A(NEND) = A(NPP)                                                  FUTSOL    220
      IFILES(LTAPE) = LFILE                                             FUTSOL    221
      CALL GEDLAB (8HFUTSOL01,LTAPE,NAME,LFILE,IRD,JCD)                 FUTSOL    222
C                                                                       FUTSOL    223
C  **  SKIP OVER L MATRIX ON LTAPE TO GET TO TRAPEZOIDAL MATRIX         FUTSOL    224
C                                                                       FUTSOL    225
      KRED = 0                                                          FUTSOL    226
      DO 128 I=1,NLCNT                                                  FUTSOL    227
      CALL GETROW (LTAPE,1,KREAD,1)                                     FUTSOL    228
      KRED = KRED + KREAD                                               FUTSOL    229
```

```
      KREAD = KREAD + ( N - KRED - 1)                               FUTSOL    230
      DO 128 LREAD = 1,KREAD                                        FUTSOL    231
      CALL GETROW (LTAPE,1,MAXW,1)                                  FUTSOL    232
      MAXH = 2*MAXW                                                 FUTSOL    233
      CALL GETROW (LTAPE,1,DUMMY,MAXH)                              FUTSOL    234
  128 CONTINUE                                                      FUTSOL    235
C                                                                   FUTSOL    236
C - - THERE, NOW WE CAN START THE BACK-SOLUTION                      FUTSOL    237
C * * NOTE..THE FIRST AVAILABLE LOCATION FOR THE SOLUTIONS IS A(N1) FUTSOL    238
C                                                                   FUTSOL    239
C                                                                   FUTSOL    240
C***   ***NL IS THE LAST SUBSCRIPT + 1 OF THE TRAPEZOIDAL A MATRIX THAT FUTSOL 241
C***   ***CORE                                                      FUTSOL    242
C                                                                   FUTSOL    243
      NL = NEND + 1                                                 FUTSOL    244
      NREM = N                                                      FUTSOL    245
      NPM = N + M                                                   FUTSOL    246
      NEL = NPM                                                     FUTSOL    247
      MP1 = M + 1                                                   FUTSOL    248
      LAST = K .EQ. N                                               FUTSOL    249
      NPASS = 0                                                     FUTSOL    250
C                                                                   FUTSOL    251
C - - SOLVE FOR THE ANSWERS CORRESPONDING TO 'K' ROWS                FUTSOL    252
C                                                                   FUTSOL    253
  119 KM1 = K - 1                                                   FUTSOL    254
      KP1 = K + 1                                                   FUTSOL    255
      NS = NL - MP1                                                 FUTSOL    256
      NPASS = NPASS + 1                                             FUTSOL    257
      DO 130 MN = 1, M                                              FUTSOL    258
      NF = NS + MN                                                  FUTSOL    259
      A(NF) = A(NF) / A(NS)                                         FUTSOL    260
      NT = NS                                                       FUTSOL    261
      IF (KM1 .EQ. 0) GO  TO 130                                    FUTSOL    262
      DO 125 IB = 1, KM1                                            FUTSOL    263
      NF = NF - IB - M                                              FUTSOL    264
      NT = NT - MP1 - IB                                            FUTSOL    265
      SUM = (0.0,0.0)                                               FUTSOL    266
      NP = NF                                                       FUTSOL    267
      N2 = MP1 + IB                                                 FUTSOL    268
      DO 120 IO = 1, IB                                             FUTSOL    269
      NN = NT + IO                                                  FUTSOL    270
      NP = NP + N2 - IO                                             FUTSOL    271
  120 SUM = SUM + A(NN) * A(NP)                                     FUTSOL    272
  125 A(NF) = (A(NF) - SUM) / A(NT)                                 FUTSOL    273
  130 CONTINUE                                                      FUTSOL    274
C                                                                   FUTSOL    275
C - - MOVE THE SOLUTIONS TO CONTIGUOUS LOCATIONS STARTING AT A(N1)  FUTSOL    276
C                                                                   FUTSOL    277
      N1 = KORE + 1                                                 FUTSOL    278
      DO 140 NN = 1, K                                              FUTSOL    279
      DO 135 MN = 1, M                                              FUTSOL    280
      NL = NL - 1                                                   FUTSOL    281
      N1 = N1 - 1                                                   FUTSOL    282
  135 A(N1) = A(NL)                                                 FUTSOL    283
  140 NL = NL - NN                                                  FUTSOL    284
C                                                                   FUTSOL    285
```

```
C
      WRITE (NIN) K
      NS = N1 - 1
      DO 145 MN = 1, M
      NT = NS + MN
  145 WRITE ( NIN ) (A(IO), IO = NT, KORE, M)
C
C - - TEST IF THIS IS THE LAST PASS
C
      IF (LAST) GO TO 200
C
C - - WE MUST NOW MODIFY THE TRIANGULAR MATRIX TO REFLECT THE EFFECT OF
C     THE SOLUTIONS OBTAINED SO FAR  (EQ 21)
C * * NOTE..LOCATIONS A(1) TO A(N1-1) ARE NOW FREE TO USE
C
C - - CALCULATE THE NEXT VALUES OF 'NEL' AND 'NREM'
C
      NELOLD = NEL
      KOLD = K
      NEL = NEL - K
      NREM = NREM - K
C
      NROW = NREM - K + 1
      IF (K .LT. NREM) GO TO 150
      LAST = .TRUE.
      NROW = 1
      K = NREM
  150 NS = 1
      NT = NELOLD + 1
C
C - - READ IN THE ROWS TO BE MODIFIED
C
      DO 190 IB = 1, NREM
      NT = NT - 1
      IF (IB .LE. NROW) GO TO 160
      NS = NS + NN
      NT = NT + NN
  160 IF (.NOT. JPASS1)GO TO 161
      NBEG = NT - M + 1
C*** ***READ RHS FROM NATAPE
      READ (NATAPE) ( A(IO),IO = NBEG,NT)
      NT = NT - M
      CALL GETROW (LTAPE,1,MAXW,1)
      NN = MAXW
      MAXH = 2*MAXW
      CALL GETROW (LTAPE,1,A(NS),MAXH)
      NT = NT + M
      NN = NN + M
      GO TO 163
  161 READ(MT)NN,(A(IO),IO=NS,NT)
  163 NP = N1 - 1
      NF = NT - M - KM1
      NN = NN - KOLD
      DO 170 MN = 1, M
      N2 = NF
      NA = NP + MN
      NB = NA
```

```
            SUM = (0.0,0.0)
            DO 165 IO = 1, KOLD
            SUM = SUM + A(N2) * A(NA)
            N2 = N2 + 1
        165 NA = NA + M
            N2 = N2 + MN - 1
        170 A(N2) = A(N2) - SUM
      C
      C - - WRITE THE MODIFIED ROW ON TAPE OR CONDENSE THE ROW
      C
            NL = NT - M + 1
            IF (IB .GE. NROW) GO TO 175
            NF = NL - KP1
            WRITE (NOUT) NN, (A(IO), IO = NS, NF), (A(IO), IO = NL, NT)
            GO TO 190
        175 NF = NL - KOLD
            DO 180 MN = NL, NT
            A(NF) = A(MN)
        180 NF = NF + 1
        190 CONTINUE
            IF( .NOT. JPASS1 ) GO TO 195
            JPASS1= .FALSE.
            REWIND NATAPE
        195 REWIND MT
            REWIND NOUT
      C
      C - - SWITCH THE TAPES
      C
            NT = MT
            MT = NOUT
            NOUT = NT
      C
      C - - LOOP BACK THRU THE SOLUTION
      C
            NL = NF
            GO TO 119
      C
      C - - START TO WRAP IT UP
      C
        200 REWIND NIN
            N2 = N
      C
      C * * NOTE.. AT THIS POINT ALL LOCATIONS A(1) THRU A(KORE) ARE FREE
      C
            DO 220 IB = 1, NPASS
            READ (NIN) K
            N1 = N2 - K + 1
            NS = N1
            NT = N2
      C
      C - - READ IN THE SOLUTIONS
      C
            DO 210 IO = 1, M
            READ (NIN) (A(NN), NN = NS, NT)
            NT = NT + N
        210 NS = NS + N
        220 N2 = N1 - 1
```

```
      C
      C  ---  REWIND ALL INPUT TAPES
            REWIND NIN
            REWIND MT
            REWIND NOUT
      C - - WRITE THE SOLUTIONS ON TAPE
      C
            NT = 0
            DO 230 IO = 1, M
            NS = NT + 1
            NT = NT + N
            IF (NPR1.EQ.0) GO TO 230
            WRITE (ITAPEW,3) IO
            WRITE (ITAPEW,2) (A(NN), NN = NS, NT)
        230 WRITE (NW) (A(NN), NN = NS, NT)
      C
            IF(LASTRS) GO TO 295
      C*** ***IF THERE ARE MORE RHS TO BE GOTTEN FROM RHS TAPE, SWITCH TAPES
      C*** ***BACK SO THAT  MT WILL CONAIN THE TRAPEZOIDAL MATRIX
      C*** ***NATAPE WILL HAVE NOTHING USEFUL ON IT.
            NTEMP = NATAPE
            NATAPE = MT
            MT = NTEMP
            REWIND NATAPE
            IFILES(LTAPE) = LFILE
            CALL GEDLAB (8HFUTSOL02,LTAPE,NAME,LFILE,IRD,JCD)
            GO TO 109
        295 CONTINUE
      C
      C   ***   REWIND ALL FILES EXCEPT THE OUTPUT FILE   NW
      C
            REWIND NI
            REWIND MM
            REWIND NO
            REWIND NAT
            REWIND RHSTAP
            MD = MTOTAL
       9999 CONTINUE
      C
      C
      C FORMATS
      C
          2 FORMAT (1H0,6E20.8)
          3 FORMAT (1H0, 10HCOLUMN NO.,I6,2X,17HOF GAMMAS FOLLOWS,//)
      C
            RETURN
            END
```

SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS	DEF LINE	REFERENCES	
3 FUTSOL	1	55	445

```
VARIABLES       SN  TYPE          RELOCATION
11355  A            COMPLEX   ARRAY              REFS        29       112     2*122       123       137     2*147       148
                                                  169       188       214       219     2*259     2*271     2*272       282
                                                  291       331     2*345       349     2*356       360       413       414
                                              DEFINED        87       123       148       188       219       259       272
                                                  282       326       335       349       360       396
 1452  B            REAL                         REFS     2*160   DEFINED       158
 1453  C            REAL                         REFS       160   DEFINED       159
 1515  DUMMY        REAL      ARRAY              REFS        27       202       233
 1435  I            INTEGER                      REFS        87       120       184   DEFINED        87       105       132
                                                  183       199       226
 1501  IB           INTEGER                      REFS       263       264       267       268       320       354
                                              DEFINED       262       318       387
    1  IFILES       INTEGER   ARRAY    CFILES    REFS        21        24   DEFINED       220       424
 1431  IINIT        INTEGER                      REFS       164       165       166   DEFINED        83
 1456  INITP1       INTEGER                      REFS       167   DEFINED       165
 1504  IO           INTEGER                      REFS       269       270       291       326       335     2*356       412
                                              DEFINED       268       291       326       335       344     2*356       395
                                                  408
 1464  IRD          INTEGER                      REFS       221       425
    0  ITAPES       INTEGER   ARRAY    CTAPES    REFS        21        23        41
 1411  ITAPEW       INTEGER                   DEFINED        41  I/O REFS       412       413
 1434  J            INTEGER                      REFS       169   DEFINED        86       169       185
 1465  JCD          INTEGER                      REFS       221       425
 1444  JCNT         INTEGER                      REFS       117       119       142       144   DEFINED       113       117
                                                  138       142       208
 1405  JPASS1       LOGICAL                      REFS        31       323       363   DEFINED       172       364
 1440  K            INTEGER                      REFS        97       101       102       145       154       161       162
                                                  163       197       205       208       248       253       254       278
                                                  287       304       305       306       308       309       389
                                              DEFINED       160       161       312       388
 1462  KCNT         INTEGER                      REFS       210       211   DEFINED       205       210
    0  KD           INTEGER            F.P.      REFS        45   DEFINED         1
 1463  KEND         INTEGER                      REFS       217   DEFINED       216
 1454  KF           INTEGER                      REFS       164       177       185       216       217
                                              DEFINED       162
    0  KFILES       INTEGER            CFILES    REFS        24
 1430  KINIT        INTEGER                      REFS        83        84        85        91        92       119       144
                                                  154   DEFINED        82       154
 1455  KLEFT        INTEGER                      REFS       167   DEFINED       164
 1441  KM1          INTEGER                      REFS       105       261       262       337   DEFINED       102       163
                                                  253
 1507  KOLD         INTEGER                      REFS       338       344       358   DEFINED       304
 1413  KORE         INTEGER                      REFS        52        55        82       159       177       184       277
                                                  291   DEFINED        45
 1474  KP1          INTEGER                      REFS       355   DEFINED       254
 1467  KREAD        INTEGER                      REFS       227       228       229       230   DEFINED       229
 1466  KRED         INTEGER                      REFS       228       229   DEFINED       225       228
 1436  KSUM         INTEGER                      REFS       101       125       130   DEFINED        93       101
 1451  KSUMP1       INTEGER                      REFS       132       156   DEFINED       130
 1407  LAST         LOGICAL                      REFS        33       295   DEFINED       248       310
 1406  LASTRS       LOGICAL                      REFS        32        77       416   DEFINED        75
    0  LFILE        INTEGER            F.P.      REFS       220       221       424       425   DEFINED         1
 1470  LREAD      * INTEGER                   DEFINED       230
    0  LTAPE        INTEGER            F.P.      REFS        97       110       112       135       137       200       202
                                                  212       214       220       221       227       231       233       328
                                                  331       424       425   DEFINED         1
```

```
VARIABLES      SN  TYPE           RELOCATION
 1415  M           INTEGER                       REFS      53       55       72       74       76       78       79
                                                   80      82       86       92      158      166      182      245
                                                  247     257      263      279      289      291      324      327
                                                  332     333      337      339      347      353      395      408
                                              DEFINED      52       56       71       77
 1443  MAXH        INTEGER                       REFS     112      137      202      214      233      331
                                              DEFINED     111      136      201      213      232      330
 1442  MAXW        INTEGER                       REFS     110      111      135      136      200      201      212
                                                  213     231      232      328      329      330
    O  MD          INTEGER            F.P.    DEFINED       1      436
    O  MM          INTEGER            F.P.       REFS      58  DEFINED        1  I/O REFS     432
 1416  MMAX        INTEGER                       REFS      54       71  DEFINED       53
 1427  MM1         INTEGER                       REFS     183      216  DEFINED       79
 1476  MN          INTEGER                       REFS     258      290      341      348      360
                                              DEFINED     257      279      289      339      359
 1426  MP1         INTEGER                       REFS     255      264      267  DEFINED       78      247
 1414  MRHS        INTEGER                       REFS      53       75       77  DEFINED       48       51
 1420  MT          INTEGER                       REFS     371      421  DEFINED       58      372      422
                                             I/O REFS      59      335      366      403
 1425  MTOTAL      INTEGER                       REFS      74       75       76       77       80      436
                                              DEFINED      70       74       76       80
 1412  N           INTEGER                       REFS      52       54       55       57       64       82       85
                                                   89      92      116      119      125      132      141      144
                                                  156     164      166      169      184      229      244      245
                                                  248     383      397      398      410  DEFINED       44
 1510  NA          INTEGER                       REFS     342      345      347  DEFINED      341      347
 1513  NAME        INTEGER   ARRAY               REFS      26      221      425
    O  NAT         INTEGER            F.P.       REFS      36  DEFINED        1  I/O REFS     434
 1410  NATAPE      INTEGER                       REFS     420  DEFINED       36      421  I/O REFS      37      169
                                                  170     326      365      423
 1511  NB        * INTEGER                    DEFINED     342
 1432  NBEG        INTEGER                       REFS      87      106      116      128      150      211      214
                                                  326 DEFINED       84       88       91      106      150      209
                                                  324
    O  ND          INTEGER            F.P.       REFS      44    2*161      197  DEFINED        1
 1424  NEL         INTEGER                       REFS     303      305  DEFINED       65      246      305
 1506  NELOLD      INTEGER                       REFS     314  DEFINED      303
 1433  NEND        INTEGER                       REFS      87       88       89      107      116      129      151
                                                  168     169      209      218      219      243
                                              DEFINED      85       89       92      107      151      166      168
                                                  204     211      218
 1477  NF          INTEGER                       REFS   2*259      263      266    2*272      340      356      360
                                                  361     377  DEFINED      258      263      337      355      358
                                                  361
    O  NI          INTEGER            F.P.       REFS      60  DEFINED        1  I/O REFS     431
 1421  NIN         INTEGER                    DEFINED      60  I/O REFS      61      287      291      382      388
                                                  396     402
 1471  NL          INTEGER                       REFS     255      280      282      283      355      356      358
                                                  359 DEFINED      243      280      283      353      377
 1437  NLCNT       INTEGER                       REFS      98      226  DEFINED       94       98
 1423  NN          INTEGER                       REFS     122      147      271      283      321      322      333
                                                  338     356      396      413      414  DEFINED       64      120
                                                  145     269      278      329      333      335      338      396
                                                  413     414
 1457  NNEW        INTEGER                       REFS     186      188      206      215      216      217
                                              DEFINED     177      186      206      215
    O  NO          INTEGER            F.P.       REFS      62  DEFINED        1  I/O REFS     433
```

```
VARIABLES       SN  TYPE            RELOCATION
  14[illegible] NOLD      INTEGER                        REFS       187       188   DEFINED       184       187
  14[illegible] NOUT      INTEGER                        REFS       372   DEFINED        62       373   I/O REFS        63       356
                                                          367       404
  1502  NP        INTEGER                        REFS       270       271       341   DEFINED       266       270       336
  1473  NPASS     INTEGER                        REFS       256       387   DEFINED       249       256
  1417  NPM       INTEGER                        REFS        55        65       246   DEFINED        54        57       245
  1445  NPP       INTEGER                        REFS     2*123     2*148       169       219   DEFINED       116       141
                                                          167       217
     0  NPR1      INTEGER            F.P.        REFS       411   DEFINED         1
  1472  NREM      INTEGER                        REFS       306       308       309       312       318
                                              DEFINED       244       306
  1461  NREMAN    INTEGER                        REFS       198       199   DEFINED       197
  1446  NROW      INTEGER                        REFS       121       122       146       147       320       354
                                              DEFINED       119       121       144       146       308       311
  1475  NS        INTEGER                        REFS       258       259       260       290       321       331       335
                                                          356       396       398       413       414   DEFINED       255       288
                                                          313       321       390       398       409
  1500  NT        INTEGER                        REFS       264       269       272       291       319       322       324
                                                          326       327       332       335       337       353       356       359
                                                          373       396       397       409       410       413       414
                                              DEFINED       260       264       290       314       319       322       327
                                                          332       371       391       397       407       410
  1447  NTBEG     INTEGER                        REFS       133       141   DEFINED       128       133
  1512  NTEMP     INTEGER                        REFS       422   DEFINED       420
  1450  NTEND     INTEGER                        REFS       134       141   DEFINED       129       134
     0  NW        INTEGER            F.P.     DEFINED         1   I/O REFS        38       414
  1505  N1        INTEGER                        REFS       281       282       288       336       390       399
                                              DEFINED       277       281       389
  1503  N2        INTEGER                        REFS       270       345       346       348     2*349       389       391
                                              DEFINED       267       340       346       348       383       399
     0  RHSTAP    INTEGER            F.P.        REFS        19        47   DEFINED         1   I/O REFS        50        51
                                                           87       435
  1403  SUM       COMPLEX                        REFS        29       122       123       147       148       271       272
                                                          345       349   DEFINED       118       122       143       147       265
                                                          271       343       345
        VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS         TYPE    ARGS        REFERENCES
        GEDLAB              6              221       425
        GETROW              4               97       110       112       135       137       200       202       212       214
                                           227       231       233       328       331
        SQRT      REAL      1 LIBRARY      160

INLINE FUNCTIONS  TYPE    ARGS        DEF LINE   REFERENCES
        MAXO      INTEGER   0  INTRIN                  55
        MINO      INTEGER   0  INTRIN                  53

STATEMENT LABELS               DEF LINE    REFERENCES
     0  1            INACTIVE       35
  1366  2         FMT              442         413
  1371  3         FMT              443         412
    22  5                           50          47
    26  6                           52          49
    61  109                         74         426
     0  110                         89          86
   121  111                         96         156
     0  112                        122         120
```

```
C
      IF (KK EQ 1) NPOINT = 0
      CALL MODAZ (KK,NQ,ITAPE,WILK,QZ,NPOINT,ENDX,ES,EL,KEND)
      CALL TIMEB (23,23HFROM MACH, AFTER MODAZ )
      IF(KSURF) WILK=.TRUE.
      IF (KSURF) REWIND MTAP14
      IF (KSURF)  CALL HELZ (KK,NQ,NCS,ES,EL,KEND,1)
      IF (KSURF)
     1CALL MODAZ (KK,NQ,MTAP14,WILK,QZ,NPOINT,ENDX,ES,EL,KEND)
      IF (KSURF) CALL HELZ (KK,NQ,NCS,ES,EL,KEND,2)
      CALL DSPMD ( KK , NQ )
      CALL TIMEB (23,23HFROM MACH, AFTER DSPMD )
    2 NWI (KK)=NWB
  300 NDI(KK)=NDB
   10 XM=0.0
      YM=0.0
      DO 15 I=1,NS
      XM=AMAX1(XM,XI(I))
   15 YM=AMAX1(YM,YI(I))
   30 NL = XM + 1.0
      LL=2 *(YM+1.0)
      REWIND  MTAP11
C
      NRF = LC(4)
      IF(LC(1) .EQ  -1) GO TO 42
      IF(LC(1) .EQ. 2 .OR. LC(33) .EQ. 1) GO TO 43
      IF (LC(13).EQ.1)  NRF = NRVBO
      GO TO 42
   43 NRF = 1
   42 CONTINUE
      NKF      =  0
      DO 150 IO=1,NRF
      NF = 0
      REWIND MTAP3
      DO 149  KK = 1,NS
      NKF      =  NKF + 1
      KDRAW=KPLOT(KK)
      NF=NF+1
      NWB=NWI(KK)
      NDB=NDI(KK)
      READ (MTAP3) NWB,ENDX ,ES,EL,KEND ,NDB
  888 DO 401 IJ=1,NWB
  401 READ(MTAP3) XW(IJ),YW(IJ),AW(IJ),IND(IJ)
      IF (NDB.EQ.0) GO TO 420
      DO 402 IJ=1,NDB
  402 READ(MTAP3) XD(IJ),YD(IJ),AD(IJ)
  420 READ(MTAP3) DUMMY
      IF ( LC(33) .NE. 0 )             VBO = 1.0E+10
      IF ( KQINT )             VBO = RVBO(IO)
      IF ( .NOT. KQINT )       VBO = VVBO(IO)
      ES=ESR(KK)
      P = 0.0
      IF ( LC(33) .EQ. 0 .OR. LC(1) .NE. 2 )   P = ES / (VBO*BR)
      XR=0.0
      X1=0.0
      NOB=(NL*(NL-1))/2+LL
      IF (LC(22).EQ.1)  GOTO 36
```

```
      CALL PTABLE (1,47,47
     1   HSUPERSONIC UNSTEADY AERODYNAMICS USING MACH BOX)
      KTABLE =  2
      CALL PTABLE (1,20,20
     1   HPROCEDURE (MACH BOX))
C
C
      KQRS=LC(6)
      NOPE = LC(7)
      AM  =  FMACH
      KQINT =  FALSE.
      IF (LC(13).NE.O)  KQINT= TRUE.
      REWIND MTAP50
      NS   =   LC(3)
      NQ  =  LC(2)
      DO 40 I=1,NS
   40 NCSS(I) = O
      READ (ITAPER.700) KSURF , NBEL , NPIF , LINC
      IF (KSURF) READ (ITAPER,1005)        (NCSS(I),I=1,NS)
      CALL TIMEB (23,23HFROM MACH, BEGIN        )
      REWIND MTAP2
      READ (ITAPER,1005)       (NSAA(K),K=1,NS)
      DO 81 IL = 1,NS
   81 KPLOT(IL) = O
      IF (LC(8).EQ.O) GO TO 83
      READ (ITAPER,1015) (KPLOT(IL),IL=1,NS)
   83 DO 84 IL = 1,NS
   84 BEX(IL) = 0.0
      IF (.NOT.NBEL) GO TO 67
      READ (ITAPER,59) (BEX(K),K=1,NS)
      WRITE (ITAPEW,76)
      DO 77 I = 1,NS
      IF (BEX(I).EQ.O.O) GO TO 77
      WRITE (ITAPEW,78) I , BEX(I)
   77 CONTINUE
   67 DO 57 I = 1,NS
      LZ(I) = 1
      IINC(I) = 10
      IF (KPLOT(I).EQ.O) GO TO 57
      READ (ITAPER,1015) LZ(I) , IINC(I)
   57 CONTINUE
C
      REWIND MTAP3
      DO 300 KK=1,NS
      CALL EVOVLE (BETA,ESR,EL,XI,YI,KK,IM,ENDX,KEND,ES)
      CALL TIMEB (23,23HFROM MACH, AFTER EVOVLE)
      CALL  PLAN (KK,AM,XI(KK))
      CALL PUDLAB(8HMACH  01,MTAP9,NAMSRF,KK,IRD,JCD)
      KSURF = .FALSE.
      WILK=.FALSE.
C     ----- DOES THIS SURFACE HAVE CONTROL SURFACES ? ----------
C
      NCS = NCSS(KK)
      IF ( NCS .NE. O )        KSURF = .TRUE
      ITAPE=MTAP9
      IF(KSURF) ITAPE=MTAP8
      IF (KSURF) REWIND MTAP8
```

```
      SUBROUTINE MACH                                                   MACH      2
C                                                                       MACH      3
      DIMENSION       XW(350) ,       YW(350) ,       XD(250)           MACH      4
      DIMENSION       YD(250) ,       AW(350) ,       AD(250)           MACH      5
      DIMENSION      R1(2000) ,       PP(350) ,      XMAX(5)            MACH      6
      DIMENSION         LS(5) ,         XI(5) ,        YI(5)            MACH      7
      DIMENSION        NWI(5) ,        NDI(5) ,    DWSH(350)            MACH      8
      DIMENSION      Q(40,40) ,     QS(40,40) ,     IND(350)            MACH      9
      DIMENSION       NSAA(5) ,      KPLOT(5) ,       ESR(5)            MACH     10
      DIMENSION       NCSS(5) ,      NCLER(5) ,     NCTER(5)            MACH     11
      DIMENSION   CLEXR(20,5) ,   CLEYR(20,5) ,  CTEXR(20,5)            MACH     12
      DIMENSION   CTEYR(20,5)                                           MACH     13
      DIMENSION        LC(40)                                           MACH     14
      DIMENSION     QMWT(40,5) ,       QWT(5)                           MACH     15
      DIMENSION VVBO(30), RVBO(15)                                      MACH     16
      DIMENSION         LZ(5) ,       IINC(5)                           MACH     17
      DIMENSION       NAME(2) ,     NAMSRF(2)                           MACH     18
      DIMENSION DUMMY(50)                                               MACH     19
      DIMENSION TSHF(1)                                                 MACH     20
      DIMENSION ITAPES(50)                                              MACH     21
C                                                                       MACH     22
      COMPLEX      Q , QS , R1 , PP , DWSH                              MACH     23
C                                                                       MACH     24
      COMMON /FLUTQ / QMWT, QWT                                         MACH     25
      COMMON /COMA  / LC, BR                                            MACH     26
      COMMON /FLUTAN/ FMACH ,BETA  ,VVBO  ,RVBO  ,NRVBO                 MACH     27
      COMMON/CORPSE/R1                                                  MACH     28
      COMMON/TOMB/XW,YW,NDB,LS,XMAX,NWB,AD,XD,YD,IND,AW                 MACH     29
      COMMON/IDIOT/CLEXR,CLEYR,CTEXR,CTEYR,NCLER,NCTER,NS               MACH     30
      COMMON /BOXS/ BEL , BSR                                           MACH     31
      COMMON /BXLL / BEX(5)                                             MACH     32
      COMMON /KIMA  / LZ, IINC                                          MACH     33
      COMMON / CTAPES / ITAPES                                          MACH     34
      COMMON /COMRWP/ ITAPER,ITAPEW,ITAPEP                              MACH     35
      COMMON /CTSHF / LTSHF ,TSHF                                       MACH     36
      COMMON /CTABLE/ KTABLE,NPASS ,NROWS, NCOLS , NCOLST,KTABLO,NPAGEA MACH     37
     1                ,ITAPET                                           MACH     38
C                                                                       MACH     39
      LOGICAL  KSURF, WILK, KQINT, NBEL, NPTF, LINC                     MACH     40
C                                                                       MACH     41
      DATA NAMSRF /4HSURF,4HACE /                                       MACH     42
C                                                                       MACH     43
      IRD=99999                                                         MACH     44
      JCD=99999                                                         MACH     45
C                                                                       MACH     46
      MTAP2  =  ITAPES(22)                                              MACH     47
      MTAP3  =  ITAPES(23)                                              MACH     48
      MTAP8  =  ITAPES(28)                                              MACH     49
      MTAP9  =  ITAPES(29)                                              MACH     50
      MTAP10 = ITAPES(30)                                               MACH     51
      MTAP11 =  ITAPES(31)                                              MACH     52
      MTAP12 =  ITAPES(32)                                              MACH     53
      MTAP14 =  ITAPES(34)                                              MACH     54
      MTAP50 =  ITAPES(50)                                              MACH     55
      NROWS  =  1                                                       MACH     56
      NCOLS  =  3                                                       MACH     57
```

```
COMMON BLOCKS   LENGTH     MEMBERS - BIAS NAME(LENGTH)
                                   9 NTP10  (1)
      COMA         41              0 LC     (40)          40 BR     (1)
      CTAPES       50              0 ITAPES (50)
      XYZ         350              0 YS     (50)          50 DELYS  (50)          100 ZS     (50)
                                 150 DELZS  (50)         200 FGAMMA (50)          250 CWIG   (50)
                                 300 DUMMY  (50)

STATISTICS
  PROGRAM LENGTH              14103B    6211
  CM LABELED COMMON LENGTH     1427B     791
       52000B CM USED
```

```
STATEMENT LABELS             DEF LINE   REFERENCES
  1020  10      FMT              209        164
  1034  12      FMT              211        177
  1050  20      FMT              213        171        184
  1055  30      FMT              214        188
  1070  32      FMT              216        104
  1101  34      FMT  NO REFS     219
  1114  36      FMT  NO REFS     221
  1120  40      FMT              222        108
     0  50                        46         43
     0  60                        54         51
     0  70                        64         62
     0  80                        65         58
   130  90                        66         57
   154  100                       76         74
  1124  111     FMT              223         32
     0  150                       92         88
     0  200                      102         77
     0  235                      109        105
   335  236                      110        103
     0  238                      137        132
     0  240                      151        122
   507  245                      152        116
     0  250                      172        165
   601  251                      173        163
     0  260                      185        178
   631  265                      186        174        176
   634  266                      189        187
     0  272                      198        194        197
     0  275                      200        191
     0  300                      201         67

LOOPS  LABEL    INDEX     FROM-TO     LENGTH    PROPERTIES
   12  2        I          29  31       14B               NOT INNER
   20  2        J          30  31        2B      INSTACK
   43  1        I          38  41        5B      INSTACK
   57  50       I          43  46        3B      INSTACK
   77  60       L          51  54        3B      INSTACK
  107  80       L          58  65       21B               NOT INNER
  122  70       I          62  64        3B      INSTACK
  131  300      J          67 201      543B               EXT REFS  NOT INNER
  155  200      K          77 102      132B               EXT REFS  NOT INNER
  210  150      I          88  92       15B        OPT
  312  235      I         105 109       23B               EXT REFS
  352  240      LB        122 151      135B               NOT INNER
  405  238      I         132 137       16B        OPT
  544  250      K         165 172       35B               EXT REFS
  610  260      L         178 185       21B               EXT REFS
  637  275      JG        191 200       32B               EXT REFS  NOT INNER
  653  272      IX        194 198        6B      INSTACK

COMMON BLOCKS   LENGTH    MEMBERS - BIAS NAME(LENGTH)
       BODY        340            0 RO     (100)          100 ROP    (100)          200 NBEA   (20)
                                220 BGMA   (20)           240 MRK    (40)           280 XBO    (20)
                                300 YBO    (20)           320 ZBO    (20)
       NTPS         10            0 NTP1   (1)              1 NTP2   (1)              2 NTP3   (1)
                                  3 NTP4   (1)              4 NTP5   (1)              5 NTP6   (1)
                                  6 NTP7   (1)              7 NTP8   (1)              8 NTP9   (1)
```

```
VARIABLES      SN  TYPE            RELOCATION
     2  NTP3       INTEGER               NTPS        REFS          6   I/O REFS      33        73
     3  NTP4       INTEGER               NTPS        REFS          6
     4  NTP5       INTEGER               NTPS        REFS          6
     5  NTP6       INTEGER               NTPS        REFS          6
     6  NTP7       INTEGER               NTPS        REFS          6   I/O REFS      34        75
     7  NTP8       INTEGER               NTPS        REFS          6
    10  NTP9       INTEGER               NTPS        REFS          6
  1211  NWP      * INTEGER                        DEFINED         42
 12064  P          COMPLEX    ARRAY                  REFS         18       89       106       107       135       136       195
                                                  DEFINED         73       75
  1174  PRES       COMPLEX                           REFS         21      108   DEFINED       106       107
  1152  PRT1       COMPLEX                           REFS         19       90        91   DEFINED        89
  1154  PRT2       COMPLEX                           REFS         19       94        95       143       144
                                                  DEFINED         93      142
  1156  PRT3       COMPLEX                           REFS         19       98        99       147       148
                                                  DEFINED         96      145
  1160  PRT4       COMPLEX                           REFS         19       98        99       147       148
                                                  DEFINED         97      146
     0  RO         REAL       ARRAY    BODY          REFS          4      134
   144  ROP        REAL       ARRAY    BODY          REFS          4
     0  SDELX      REAL       ARRAY      F.P.        REFS         10       61        63        89       134
                                                  DEFINED          1
  1227  SGAM       REAL                              REFS         85   DEFINED       83
  1224  SIGN1      REAL                              REFS         94       98       100   DEFINED        80        84
  1225  SIGN2      REAL                              REFS         95       99       100   DEFINED        81        85
     0  X          REAL       ARRAY      F.P.        REFS         11       61       136   DEFINED         1
  1212  XA         REAL                              REFS         48      158       159   DEFINED        47
  1213  XB         REAL                              REFS        160   DEFINED       48
  2154  XBLE       REAL       ARRAY                  REFS         12      136       146   DEFINED        52        61
   430  XBO        REAL       ARRAY    BODY          REFS          4
  1214  XC         REAL                              REFS        161      162   DEFINED        49
     0  XIJ        REAL       ARRAY      F.P.        REFS         10       91        97   DEFINED         1
  1240  XMULT      REAL                              REFS        143      144       147       148   DEFINED       130       131
     0  XOC        REAL       ARRAY      F.P.        REFS         11      108   DEFINED         1
     0  Y          REAL       ARRAY      F.P.        REFS         11      108       128       181   DEFINED         1
  1246  YBOS       REAL                              REFS        184   DEFINED      183
   454  YBO        REAL       ARRAY    BODY          REFS          4
  1252  YOS        REAL       ARRAY                  REFS         10      171   DEFINED       166
     0  YS         REAL       ARRAY    XYZ           REFS         23      100       166       171
  1236  YSB        REAL                              REFS        131      149       183       184   DEFINED       128       181
   500  ZBO        REAL       ARRAY    BODY          REFS          4
   144  ZS         REAL       ARRAY    XYZ           REFS         23      100       171
  1237  ZSB        REAL                              REFS        149      184   DEFINED       129       182
     0  ZZ         REAL       ARRAY      F.P.        REFS         11      108       129       182   DEFINED         1
        VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS          TYPE     ARGS       REFERENCES
        COS        REAL       1 LIBRARY     82
        SIN        REAL       1 LIBRARY     83

INLINE FUNCTIONS   TYPE     ARGS        DEF LINE   REFERENCES
        ABS        REAL       1  INTRIN                131
        FLOAT      REAL       1  INTRIN                 47        49

STATEMENT LABELS              DEF LINE    REFERENCES
     0  1                        41          38
```

```
VARIABLES     SN  TYPE          RELOCATION
10424   GF        COMPLEX    ARRAY               REFS      17      196   DEFINED     195
 1136   GFT       COMPLEX                        REFS      17      196       199 DEFINED     193     196
 1204   I         INTEGER                        REFS      31       39        44      45      63      73    2*89
                                                   91     106    2*107     5*108     134     135   2*136
                                              DEFINED      29       38        43      62      73      88     105
                                                  132
 1250   IB        INTEGER                        REFS     192  DEFINED       192
 1217   IBX1      INTEGER                        REFS      56       60       117     127 DEFINED      55
 1245   IL        INTEGER                        REFS     181      182   DEFINED     180
 1222   IP        INTEGER                        REFS      75  DEFINED        75
 1215   IP1       INTEGER                        REFS      75  DEFINED        50
    0   ITAPES    INTEGER    ARRAY    CTAPES     REFS       8       14        26      36
 1202   ITAPEW    INTEGER                     DEFINED      26 I/O REFS        32     104     108     164     171
                                                  177     184      188
 1251   IX        INTEGER                        REFS   3*195      196   DEFINED     194
 1221   I1        INTEGER                        REFS    2*61       62        88     128     129     132
                                              DEFINED      59       86       126
 1220   I2        INTEGER                        REFS      59       62        88     126     132
                                              DEFINED      56       60        87     117     127
 1205   J         INTEGER                        REFS      31      104       164     177     199
                                              DEFINED      30       67
 1247   JG        INTEGER                        REFS     199  DEFINED       191
 1223   K         INTEGER                        REFS      78       79        82      83      86      87    3*90
                                                 4*91    2*93       94        95    2*96    3*97      98      99
                                                4*100   2*101    2*166       167     168     169     170   4*171
                                              DEFINED      77      165
 1234   KB        INTEGER                        REFS     133      134   DEFINED     121     133
 1244   KL        INTEGER                        REFS     179      180       184 DEFINED     175     179
 1216   L         INTEGER                        REFS      52       53        60      61    2*63   2*184
                                              DEFINED      51       58       178
 1235   LB        INTEGER                        REFS     123      124     2*135   2*136     142     145     146
                                                  150 DEFINED      122
    0   LC        INTEGER    ARRAY    COMA       REFS       7       13       103     163     176     187
    0   LIM       INTEGER    ARRAY     F.P.      REFS      10       86        87 DEFINED       1
 1233   LL        INTEGER                        REFS     125      127       134   2*136     138     139   2*141
                                                  142     145    2*146       150 DEFINED     120     125
 1231   L1        INTEGER                        REFS     122      178   DEFINED     118
 1232   L2        INTEGER                        REFS     122      178   DEFINED     119
 1203   MID       INTEGER                        REFS      29       30   DEFINED      28
 1210   MK        INTEGER                        REFS    2*40  DEFINED        39
 1207   MMRK      INTEGER                        REFS      40       42   DEFINED      37      40
  360   MRK       INTEGER    ARRAY    BODY       REFS       4       37        39
 1206   MTAP      INTEGER                     DEFINED      36 I/O REFS       202     203     204
    0   NB        INTEGER              F.P.      REFS      38       57        58     116     119     174     197
                                              DEFINED       1
  310   NBEA      INTEGER    ARRAY    BODY       REFS       4       60       127     180
    0   NBOX      INTEGER              F.P.      REFS      50       55        73      74     105     180
                                              DEFINED       1
    0   NBV       INTEGER              F.P.      REFS   2*107  DEFINED         1
    0   NDELT     INTEGER              F.P.      REFS      47       49   DEFINED       1
    0   NMD       INTEGER              F.P.      REFS      67      191   DEFINED       1
    0   NSTRIP    INTEGER              F.P.      REFS      77      118       119     165 DEFINED       1
    0   NSV       INTEGER              F.P.      REFS   2*169    2*170   DEFINED       1
    0   NTOT      INTEGER              F.P.      REFS      74       75       192     194 DEFINED       1
    0   NTP1      INTEGER              NTPS      REFS       6
   11   NTP10     INTEGER              NTPS      REFS       6 I/O REFS        35     190     192
```

```
       SUBROUTINE GENF       74/74   OPT=1                         FTN 4.8+577       85/01/23. 08.10.44      PAGE      5

 CARD NR. SEVERITY  DETAILS    DIAGNOSIS OF PROBLEM

     197     I      272       THIS IF DEGENERATES INTO A SIMPLE TRANSFER TO THE LABEL INDICATED.



       SYMBOLIC REFERENCE MAP (R=3)

 ENTRY POINTS      DEF LINE      REFERENCES
     3  GENF              1        225

 VARIABLES      SN  TYPE            RELOCATION
      0  ACAP       REAL                   F.P.       REFS       47        49   DEFINED        1
   1334  BF         REAL        ARRAY                 REFS       11       195   DEFINED      192
    334  BGMA       REAL        ARRAY    BODY         REFS        4       139       141
     50  BR         REAL                 COMA         REFS        7
      0  B2         REAL                   F.P.       REFS       49       166       183   DEFINED        1
   2200  CBODY      REAL        ARRAY                 REFS       12        63       134       136      138      141      142
                                                       145      146       150   DEFINED        53       63
   1241  CFAC       REAL                              REFS      135       136   DEFINED      134
   1226  CGAM       REAL                              REFS       84   DEFINED        82
   1150  CLI        COMPLEX                           REFS       19       101       157       162      188
                                                    DEFINED      72       101       157       162
   1172  CLIB       COMPLEX                           REFS       20       150       157   DEFINED      115      150
  13524  CLJ        COMPLEX     ARRAY                 REFS       18        90        93        97      101      135      142
                                                       146      150       167       184   DEFINED       44       78       90
                                                       123      135
   1176  CLJXK      COMPLEX                           REFS       21       169       171   DEFINED      167      169
   1144  CM         COMPLEX                           REFS       19        98       155       160      188
                                                    DEFINED      70        98       155       160
   1166  CMB        COMPLEX                           REFS       20       147       155   DEFINED      113      147
  13670  CMJ        COMPLEX     ARRAY                 REFS       18        91        96       136      145      168      184
                                                    DEFINED      45        79        91       124      136
   1200  CMJXK      COMPLEX                           REFS       21       170       171   DEFINED      168      170
   1146  CN         COMPLEX                           REFS       19        99       156       161      188
                                                    DEFINED      71        99       156       161
   1170  CNB        COMPLEX                           REFS       20       148       156   DEFINED      114      148
    372  CWIG       REAL        ARRAY    XYZ          REFS       23        90        91        93       96       97      101
   1142  CY         COMPLEX                           REFS       19        95       154       159      188
                                                    DEFINED      69        95       154       159
   1164  CYB        COMPLEX                           REFS       20       144       154   DEFINED      112      144
   1140  CZ         COMPLEX                           REFS       19        94       153       158      188
                                                    DEFINED      68        94       153       158
   1162  CZB        COMPLEX                           REFS       20       143       153   DEFINED      111      143
     62  DELYS      REAL        ARRAY    XYZ          REFS       23        94        98       100
    226  DELZS      REAL        ARRAY    XYZ          REFS       23        95        99       100
    454  DUMMY      REAL        ARRAY    XYZ          REFS       23
   1242  DYB        REAL                              REFS      143       147       149   DEFINED      138      139
   1243  DZB        REAL                              REFS      144       148       149   DEFINED      140      141
      0  EV         REAL        ARRAY      F.P.       REFS       10        91       108   DEFINED        1
   1230  FACT       REAL                              REFS      101       150   DEFINED       100      149
    310  FGAMMA     REAL        ARRAY    XYZ          REFS       23        82        83
      0  FL         REAL                   F.P.       REFS       48   DEFINED         1
      0  FREQ       REAL                   F.P.       REFS       32   DEFINED         1
   2224  GENFM      COMPLEX     ARRAY                 REFS       16       203   DEFINED        31      199
```

```
  250 CONTINUE
  251 CONTINUE
      IF (NB.EQ.0)  GO TO  265
      KL    = 0
      IF (LC(8)  EQ. 0)  GOTO 265
      WRITE (ITAPEW,12) J
      DO 260  L=L1,L2
      KL    = KL+1
      IL    = NBOX + NBEA(KL)
      YSB   = Y(IL)
      ZSB   =ZZ(IL)
      YBOS = YSB/B2
      WRITE (ITAPEW,20)  KL,YSB,ZSB,YBOS,CLJ(L),CMJ(L)
  260 CONTINUE
  265 CONTINUE
      IF (LC(8) .EQ  0)  GOTO 266
      WRITE (ITAPEW,30) CZ, CY, CM, CN, CLI
  266 CONTINUE
      REWIND  NTP10
      DO 275  JG=1,NMD
      READ  (NTP10)  (BF(IB),  IB=1,NTOT)
      GFT  =(0.0,0.0)
      DO 272  IX=1,NTOT
      GF(IX)=      P(IX)*BF(IX)
      GFT    = GFT + GF(IX)
      IF (NB .EQ  0) GO TO 272
  272 CONTINUE
      GENFM(J,JG)=GFT
  275 CONTINUE
  300 CONTINUE
      REWIND MTAP
      WRITE  (MTAP) GENFM
      REWIND MTAP
C
C
C FORMATS
C
   10 FORMAT  (1H1,40X, 7HMODE NO,I4//10X, 9HSTRIP NO.,5X,1HY,12X,1HZ,
     112X, 3HYOS,10X,16HLIFT COEFFICIENT,18X,18HMOMENT COEFFICIENT/)
   12 FORMAT  (1H0,40X, 7HMODE NO,I4//10X, 9HBODY  NO.,5X,1HY,12X,1HZ,
     112X, 3HYOS,10X,16HLIFT COEFFICIENT,18X,18HMOMENT COEFFICIENT/)
   20 FORMAT  (1H0,13X,I4, 3F12.4, 2F16.6,5X, 2F16.6)
   30 FORMAT  (1H0,3X//15X, 4HCZ =,2F16.6,10X,4HCY =,2F16.6/15X, 4HCM =,
     1         2F16.6,10X,4HCN =,2F16.6/15X,10HCL(ROLL) =,2F16.6/)
   32 FORMAT (1H1,40X, 7HMODE NO,  I4//
     1            5X, 9HBOX NO.  ,3X, 3HXOC,5X,2H X,7X,2HY ,7X,2HZ ,15X,
     2 9HPRESSURES//)
   34 FORMAT  (1H0,3X//15X,13HPRESSURE MODE,5X,15HDEFLECTION MODE,10X,
     1 45HGENERALIZED FORCES PER UNIT DYNAMIC PRESSURE ,/)
   36 FORMAT  (1H0,20X,I4,16X,I4,5X,2E18.8)
   40 FORMAT (1H0, 5X,I3,F10.5,3F11.5,2E18.8)
  111 FORMAT (1H0,5X,19HREDUCED FREQUENCY =,E10.3 )
C
      RETURN
      END
```

```
      CLIB = (0.0,0.0)                                      GENF     116
      IF (NB.EQ.0)  GO TO  245                              GENF     117
      I2   = IBX1                                           GENF     118
      L1   = NSTRIP+1                                       GENF     119
      L2   = NSTRIP+NB                                      GENF     120
      LL   = 0                                              GENF     121
      KB   = 0                                              GENF     122
      DO 240  LB=L1,L2                                      GENF     123
      CLJ(LB) = (0.0,0.0)                                   GENF     124
      CMJ(LB) = (0.0,0.0)                                   GENF     125
      LL   = LL+1                                           GENF     126
      I1   = I2+1                                           GENF     127
      I2   = IBX1+NBEA(LL)                                  GENF     128
      YSB  = Y(I1)                                          GENF     129
      ZSB  =ZZ(I1)                                          GENF     130
      XMULT= 1.0                                            GENF     131
      IF (ABS(YSB).LE.0.0001)  XMULT=0.5                    GENF     132
      DO 238  I=I1,I2                                       GENF     133
      KB   = KB+1                                           GENF     134
      CFAC = 2.0*RO(KB)*SDELX(I) /(CBODY(LL)**2)            GENF     135
      CLJ(LB) = CLJ(LB)+P(I)*CFAC                           GENF     136
      CMJ(LB) = CMJ(LB)-P(I)*CFAC*(X(I)-XBLE(LL))/CBODY(LL) GENF     137
  238 CONTINUE                                              GENF     138
      DYB  = CBODY(LL)                                      GENF     139
      IF (BGMA(LL).LT.0.0)  DYB=0.0                         GENF     140
      DZB  = 0.0                                            GENF     141
      IF (BGMA(LL).LT.0.0)  DZB=CBODY(LL)                   GENF     142
      PRT2 = CLJ(LB)*CBODY(LL)                              GENF     143
      CZB  = CZB + PRT2*DYB*XMULT                           GENF     144
      CYB  = CYB + PRT2*DZB*XMULT                           GENF     145
      PRT3 =-CMJ(LB)*CBODY(LL)**2                           GENF     146
      PRT4 = CLJ(LB)*CBODY(LL)*XBLE(LL)                     GENF     147
      CMB  = CMB + (PRT3+PRT4)*DYB*XMULT                    GENF     148
      CNB  = CNB + (PRT3+PRT4)*DZB*XMULT                    GENF     149
      FACT = YSB*DYB + ZSB*DZB                              GENF     150
      CLIB = CLIB + CLJ(LB)*CBODY(LL)*FACT                  GENF     151
  240 CONTINUE                                              GENF     152
  245 CONTINUE                                              GENF     153
      CZ   = CZ + CZB                                       GENF     154
      CY   = CY + CYB                                       GENF     155
      CM   = CM + CMB                                       GENF     156
      CN   = CN + CNB                                       GENF     157
      CLI  = CLI+ CLIB                                      GENF     158
      CZ   = XA*CZ                                          GENF     159
      CY   =-XA*CY                                          GENF     160
      CM   = XB*CM                                          GENF     161
      CN   = XC*CN                                          GENF     162
      CLI  =-XC*CLI                                         GENF     163
      IF (LC(8).EQ.0)  GOTO 251                             GENF     164
      WRITE (ITAPEW,10)  J                                  GENF     165
      DO 250 K=1,NSTRIP                                     GENF     166
      YOS(K) = YS(K)/B2                                     GENF     167
      CLJXK= CLJ(K)                                         GENF     168
      CMJXK= CMJ(K)                                         GENF     169
      IF (NSV.NE.0.AND.K.LE.NSV)  CLJXK=2.0*CLJXK           GENF     170
      IF (NSV.NE.0.AND.K.LE.NSV)  CMJXK=2.0*CMJXK           GENF     171
```

```
      DO  80  L=1,NB
      I1    = I2+1
      I2    = IBX1+NBEA(L)
      XBLE(L)  = X(I1)-SDELX(I1)/2.0
      DO  70  I=I1,I2
      CBODY(L) = CBODY(L)+SDELX(I)
   70 CONTINUE
   80 CONTINUE
   90 CONTINUE
      DO 300 J=1,NMD
      CZ    = (0.0,0.0)
      CY    = (0.0,0.0)
      CM    = (0.0,0.0)
      CN    = (0.0,0.0)
      CLI   = (0.0,0.0)
      READ  (NTP3)   (P(I),  I = 1, NBOX)
      IF (NBOX.EQ.NTOT)  GO TO 100
      READ  (NTP7 )  (P(IP), IP=IP1,NTOT)
  100 CONTINUE
      DO 200 K=1,NSTRIP
      CLJ(K) = (0.0,0.0)
      CMJ(K) = (0.0,0.0)
      SIGN1= 1.0
      SIGN2= 1.0
      CGAM = COS(FGAMMA(K))
      SGAM = SIN(FGAMMA(K))
      IF (CGAM.LT.0.0)  SIGN1=-1.0
      IF (SGAM.LT.0.0)  SIGN2=-1.0
      I1    = LIM(K,1)
      I2    = LIM(K,2)
      DO 150 I=I1,I2
      PRT1 = P(I)*SDELX(I)
      CLJ(K) = CLJ(K) + PRT1/CWIG(K)
      CMJ(K) = CMJ(K) - PRT1*(EV(I)-XIJ(K))/(CWIG(K)**2)
  150 CONTINUE
      PRT2 = CLJ(K)*CWIG(K)
      CZ    = CZ + PRT2*DELYS(K)*SIGN1
      CY    = CY + PRT2*DELZS(K)*SIGN2
      PRT3 =-CMJ(K)*(CWIG(K)**2)
      PRT4 = CLJ(K)* CWIG(K)*XIJ(K)
      CM    = CM + (PRT3+PRT4)*DELYS(K)*SIGN1
      CN    = CN + (PRT3+PRT4)*DELZS(K)*SIGN2
      FACT = YS(K)*DELYS(K)*SIGN1 + ZS(K)*DELZS(K)*SIGN2
      CLI   = CLI+ CLJ(K)*CWIG(K)*FACT
  200 CONTINUE
      IF (LC(7) .EQ. 0) GO TO 236
      WRITE (ITAPEW,32)  J
      DO 235  I=1,NBOX
      PRES = P(I)
      IF (NBV.NE.0.AND.I.LE.NBV)  PRES=2.0*P(I)
      WRITE (ITAPEW,40) I,XOC(I),EV(I),Y(I),ZZ(I), PRES
  235 CONTINUE
  236 CONTINUE
      CZB   = (0.0,0.0)
      CYB   = (0.0,0.0)
      CMB   = (0.0,0.0)
      CNB   = (0.0,0.0)
```

```
      SUBROUTINE GENF(NDELT,NB,NSTRIP,NBOX,NTOT,NBV,NSV,NMD,LIM,ACAP,FL, GENF   2
     1          B2,EV,Y,ZZ,SDELX,XIJ,XOC,X,FREQ)                         GENF   3
C                                                                        GENF   4
      COMMON/BODY/ RO(100), ROP(100), NBEA(20), BGMA(20), MRK(20,2),     GENF   5
     1            XBO(20), YBO(20), ZBO(20)                              GENF   6
      COMMON  /NTPS/  NTP1,NTP2,NTP3,NTP4,NTP5,NTP6,NTP7,NTP8,NTP9,NTP10 GENF   7
      COMMON/COMA  / LC,BR                                               GENF   8
      COMMON / CTAPES / ITAPES                                           GENF   9
C                                                                        GENF  10
      DIMENSION  LIM(50,3), XIJ(50),YOS(50),EV(400),SDELX(400)           GENF  11
      DIMENSION   BF(400) ,   Y(400) , ZZ(400) , XOC(400) , X(400)       GENF  12
      DIMENSION  XBLE(20), CBODY(20)                                     GENF  13
      DIMENSION LC(40)                                                   GENF  14
      DIMENSION ITAPES(50)                                               GENF  15
C                                                                        GENF  16
      COMPLEX   GENFM(40,40)                                             GENF  17
      COMPLEX   GF(400), GFT                                             GENF  18
      COMPLEX  P(400), CLJ(50), CMJ(50)                                  GENF  19
      COMPLEX  CZ,CY,CM,CN,CLI,PRT1,PRT2,PRT3,PRT4                       GENF  20
      COMPLEX    CZB,CYB,CMB,CNB,CLIB                                    GENF  21
      COMPLEX    PRES,CLJXK,CMJXK                                        GENF  22
C                                                                        GENF  23
      COMMON /XYZ/YS(50),DELYS(50),ZS(50),DELZS(50),FGAMMA(50),CWIG(50)  GENF  24
     1           ,DUMMY(50)                                              GENF  25
C                                                                        GENF  26
      ITAPEW  = ITAPES(6)                                                GENF  27
C                                                                        GENF  28
      MID = 40                                                           GENF  29
      DO 2 I=1,MID                                                       GENF  30
      DO 2 J=1,MID                                                       GENF  31
    2 GENFM(I,J)  = 0.                                                   GENF  32
      WRITE (ITAPEW,111) FREQ                                            GENF  33
      REWIND  NTP3                                                       GENF  34
      REWIND  NTP7                                                       GENF  35
      REWIND  NTP10                                                      GENF  36
      MTAP   =  ITAPES(36)                                               GENF  37
      MMRK = MRK(1,1)                                                    GENF  38
      DO 1 I = 1,NB                                                      GENF  39
      MK = MRK(I,1)                                                      GENF  40
      IF (MK.LT.MMRK) MMRK = MK                                          GENF  41
    1 CONTINUE                                                           GENF  42
      NWP = MMRK - 1                                                     GENF  43
      DO 50  I=1,50                                                      GENF  44
      CLJ(I) = (0.0,0.0)                                                 GENF  45
      CMJ(I) = (0.0,0.0)                                                 GENF  46
   50 CONTINUE                                                           GENF  47
      XA   = FLOAT(1+NDELT) /(2.0*ACAP)                                  GENF  48
      XB   = -XA/FL                                                      GENF  49
      XC   = -FLOAT(1-NDELT)/(2.0*ACAP*B2)                               GENF  50
      IP1  = NBOX+1                                                      GENF  51
      DO  60  L=1,20                                                     GENF  52
      XBLE(L) = 0.0                                                      GENF  53
      CBODY(L)= 0.0                                                      GENF  54
   60 CONTINUE                                                           GENF  55
      IBX1 = NBOX                                                        GENF  56
      I2   = IBX1                                                        GENF  57
      IF (NB.EQ.0) GO TO 90                                              GENF  58
```

```
LOOPS  LABEL   INDEX   FROM-TO    LENGTH   PROPERTIES
  605  140     NN      278 283      20B              NOT INNER
  613  135     MN      279 282       6B     INSTACK
  632  145     MN      289 291      21B              EXT REFS  NOT INNER
  640          IO      291 291       7B              EXT REFS
  667  190     IB      318 362     152B              EXT REFS  NOT INNER
  742  170     MN      339 349      40B              NOT INNER
  756  165     IO      344 347      12B       OPT
 1031  180     MN      359 361       4B     INSTACK
 1062  220     IB      387 399      30B              EXT REFS  NOT INNER
 1071  210     IO      395 398      14B              EXT REFS
 1121  230     IO      408 414      27B              EXT REFS

COMMON BLOCKS  LENGTH   MEMBERS - BIAS NAME(LENGTH)
       CTAPES      50            0 ITAPES (50)
       CFILES      51            0 KFILES (1)            1 IFILES (50)

STATISTICS
  PROGRAM LENGTH              21240B    8864
  CM LABELED COMMON LENGTH      145B     101
          52000B CM USED
```

```
STATEMENT LABELS              DEF LINE   REFERENCES
    0  113                       123        116
    0  114                       124        105
    0  115                       149        132
  266  116                       158        125
    0  117                       169        167
    0  118                       189        183        185
  510  119                       253        378
    0  120                       271        268
    0  121                       219        208        217
    0  122                       203        199
    0  123                       147        145
    0  124                       148        141
    0  125                       272        262
  401  126                       204        198
    0  128                       234        226        230
  600  130                       273        257        261
    0  135                       282        279
    0  140                       283        278
    0  145                       291        289
  664  150                       313        309
  675  160                       323        320
  724  161                       335        323
  733  163                       336        334
    0  165                       347        344
    0  170                       349        339
 1022  175                       358        354
    0  180                       361        359
 1036  190                       362        318        357
 1044  195                       366        363
 1055  200                       382        295
    0  210                       398        395
    0  220                       399        387
 1136  230                       414        408        411
 1164  295                       427         72        416
  363  1118                      190        182
    0  9999         INACTIVE     437

LOOPS  LABEL   INDEX      FROM-TO    LENGTH    PROPERTIES
   77  110     J           86 89       15B                EXT REFS
  131  114     I          105 124      50B                EXT REFS  NOT INNER
  144  113     NPP        116 123      32B                NOT INNER
  156  112     NN         120 122      10B        OPT
  207  115     I          132 149      50B                EXT REFS  NOT INNER
  222  124     NPP        141 148      32B                NOT INNER
  234  123     NN         145 147      10B        OPT
  312  117     NPP        167 169      20B                EXT REFS  NOT INNER
  317          J          169 169       7B                EXT REFS
  341  118     I          183 189      22B                NOT INNER
  352  118     J          185 189       6B     INSTACK
  367  122     I          199 203      12B                EXT REFS
  406  121     JCNT       208 219      36B                EXT REFS  NOT INNER
  434  121     NPP        217 219       5B     INSTACK
  454  128     I          226 234      23B                EXT REFS  NOT INNER
  463  128     LREAD      230 234      12B                EXT REFS
  516  130     MN         257 273      65B                NOT INNER
  532  125     IB         262 272      46B                NOT INNER
```

```
      DO 32 I=1,NOB
   32 R1(I)=CMPLX(XR,X1)
      CALL COFFIN (NL,P,AM,LL,EL,KK, VBO     ,NPIF)
      CALL TIMEB (23,23HFROM MACH, AFTER COFFIN)
   36 CALL GEDLAB(8HMACH  O1,MTAP9,NAME,NF,IRDU,JCDU)
      OSAAA = NSAA(KK)
      REWIND MTAP12
      IF (LC(22).NE.-1)  GOTO 14
      CALL RIP ( NQ,OSAAA,P,ES,LC(35) )
      CALL TIMEB (23,23HFROM MACH, AFTER RIP    )
          GO TO 60
   14 CALL TRIP ( OSAAA,NQ,LINC,LC(22),NKF,P,ES,VBO,LC(35) )
      REWIND MTAP14
C     CALL TIME (0,0,ZRIP,4)
   60 IF ( LC(35) .NE. 0 .AND. NDB .NE  0 .AND. LC(22) .NE  1 )
     1         CALL DSPDDW ( KK, NQ , VBO , LC(33) )
      IF (NOPE.EQ.0) GO TO 99
      REWIND MTAP12
      DO 45 I = 1,NQ
      WRITE (ITAPEW,900)  VBO
      LINE = 8
      WRITE (ITAPEW,960) I
      CALL CNRW (-MTAP12,PP,NWB)
      DO 45 J = 1,NWB
      LINE = LINE + 1
      IF (LINE.LT.45) GO TO 79
      LINE = 10
      WRITE (ITAPEW,900)  VBO
      WRITE (ITAPEW,960) I
   79 XWIN = (XW(J) + 0.5) * ES * 12.0
      YWIN = (YW(J) + 0.5) * ES * 12.0 / BETA
      WRITE (ITAPEW,2002) J , PP(J) , XWIN , YWIN
   45 CONTINUE
   99 CONTINUE
      DO 80 K = 1,NQ
      DO 80 KJ = 1,NQ
      IF (KK.EQ.1) Q(K,KJ) = 0.0
   80 QS(K,KJ) = 0.0
C
      CALL GEDLAB(8HMACH  O2,MTAP9,NAME,NF,IRDU,JCDU)
      DO 100 K = 1,NQ
      MAX=2*NWB
      CALL GETROW(MTAP9,1,DWSH,MAX)
      ZQ1 = QMWT(K,KK)
      REWIND MTAP12
      DO 110 K1 = 1,NQ
      CALL CNRW (-MTAP12,PP,NWB)
      ZQ2 = QMWT(K1,KK)
      IF ( LC(33) .NE. 0 )    FACTOR = 1.0 / (BR*BR)
      IF ( LC(33) .EQ. 0 )    FACTOR = VBO * VBO
      DO 120 KJ = 1,NWB
      H   =  REAL (DWSH(KJ))
  120 QS(K,K1) = QS(K,K1) + AW(KJ)*PP(KJ)*H*ES*ES*EL*0.5*BR*BR
     1*FACTOR*ZQ1*ZQ2*QWT(KK)
  110 Q(K,K1) = Q(K,K1) + QS(K,K1)
  100 CONTINUE
      IF (KK.NE.NS) GO TO 5000
```

```
      DO 111 K=1,NQ
  111 WRITE(MTAP50)  (Q(K,K1),K1=1,NQ)
 5000 CONTINUE
      IF ( KQRS .EQ. 0 )       GO TO 51
      LINE = 8
      KONS = NQ/3 + NQ - 3*(NQ/3) + 1
      WRITE (ITAPEW,2015) AM ,  VBO      , KK
      DO 88 K2=1,NQ
      LINE = LINE + KONS
      IF (LINE.LE.62) GO TO 88
      LINE = 8 + KONS
      WRITE (ITAPEW,2015) AM ,  VBO      , KK
   88 WRITE (ITAPEW,710) (QS(K2,K3),K3=1,NQ)
      IF(NS.EQ.1) GO TO 51
      IF(KK.NE.NS) GO TO 51
      WRITE(ITAPEW,130) AM,VBO
      DO 225 I2=1,NQ
  225 WRITE(ITAPEW,710) (Q(I2,J1),J1=1,NQ)
   51 CONTINUE
      REWIND MTAP12
      IF(KDRAW) 450,450,350
  350 CALL IMAGE (NQ,KK,ES,EL,VBO,AM)
      CALL TIMEB (23,23HFROM MACH, AFTER IMAGE )
  450 CONTINUE
  149 CONTINUE
  150 CONTINUE
      IF (.NOT.KQINT) GO TO 19
      CALL QINTP (MTAP50,NQ,LC(4),RVBO,NRVBO,AM,VVBO)
   19 CONTINUE
C
C
C FORMATS
C
   59 FORMAT  (6E10.3)
   76 FORMAT (1H1,/15X36HBOX ELIMINATION IN FORWARD DIAPHRAGM, //
     1        12X7HSURFACE,5X27HINCHES FWD. OF LEADING EDGE,//)
   78 FORMAT ((12X,I3,15X,E12.4)/)
  130 FORMAT(1H1,5X44H SUM OF GENERALIZED AIRFORCES FOR MACH NO = ,
     1F10.3,/5X5HVBO= ,E10.3,/15X7HBY ROWS,10X11H(REAL,IMAG), /)
  700 FORMAT (14L5)
  710 FORMAT(/( T3,1PE10.3,T15,1PE10.3, T1,2H (,T13,2H, , T25,2H) ,
     1         T29,1PE10.3,T41,1PE10.3,T27,2H (,T39,2H, , T51,2H) ,
     2         T55,1PE10.3,T67,1PE10.3,T53,2H (,T65,2H, , T77,2H) ))
  900 FORMAT (1H1,/15X28HPLANFORM PRESSURES AT VBO = , F7.3 //
     1        8X4HMODE,15X8HPRESSURE, /15X3HBOX,3X
     2        21H( REAL    , IMAGINARY ),7X 6HX(IN.),7X6HY(IN.),//)
  960 FORMAT (9X,I3)
 1005 FORMAT (10I5)
 1015 FORMAT(5I5)
 2002 FORMAT (14X,I4,2X,E10.3,2X,E10.3,5X,E10.3,3X,E10.3)
 2015 FORMAT (1H1,5X37HGENERALIZED AIR FORCES FOR MACH NO = ,F10.3/5X
     1        6HVBO = ,E12.4/5X14HSURFACE NO. = ,I3,/15X7HBY ROWS,10X
     2        16H(REAL,IMAGINARY),//)
      RETURN
      END
```

```
SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS      DEF LINE      REFERENCES
    1  MACH              1         282

VARIABLES      SN  TYPE            RELOCATION
  1310  AD         REAL       ARRAY     TOMB          REFS         4       28   DEFINED       160
  1630  AM         REAL                               REFS       104      174       235       240       244       250       256
                                                   DEFINED        67
  3424  AW         REAL       ARRAY     TOMB          REFS         4       28       224   DEFINED       157
     0  BEL        REAL                 BOXS          REFS        30
     1  BETA       REAL                 FLUTAN        REFS        26      102       202
     0  BEX        REAL       ARRAY     BXLL          REFS        31       90        91   DEFINED        85        87
    50  BR         REAL                 COMA          REFS        25      167     2*220     2*224
     1  BSR        REAL                 BOXS          REFS        30
     0  CLEXR      REAL       ARRAY     IDIOT         REFS        11       29
   144  CLEYR      REAL       ARRAY     IDIOT         REFS        11       29
   310  CTEXR      REAL       ARRAY     IDIOT         REFS        11       29
   454  CTEYR      REAL       ARRAY     IDIOT         REFS        12       29
 21156  DUMMY      REAL       ARRAY                   REFS        18  DEFINED       161
  3232  DWSH       COMPLEX    ARRAY                   REFS         7       22       214       223
  1637  EL         REAL                               REFS       102      117       121       122       124       174       224
                                                       250   DEFINED      155
  1641  ENDX       REAL                               REFS       102      117       122   DEFINED       155
  1643  ES         REAL                               REFS       102      117       121       122       124       167       180
                                                       183       201      202     2*224       250   DEFINED       155       165
 21140  ESR        REAL       ARRAY                   REFS         9      102       165
  1703  FACTOR     REAL                               REFS       224  DEFINED       220       221
     0  FMACH      REAL                 FLUTAN        REFS        26       67
  1704  H          REAL                               REFS       224  DEFINED       223
  1632  I          INTEGER                            REFS        74       76        90      2*91        94        95        96
                                                      2*97       132      133       173       193       200
                                                   DEFINED        73       76        89        93       131       172       190
     5  IINC       INTEGER    ARRAY     KIMA          REFS        16       32   DEFINED        95        97
  1661  IJ         INTEGER                            REFS     4*157    3*160   DEFINED       156       159
  1635  IL         INTEGER                            REFS        81       83        85   DEFINED        80        83        84
  1640  IM       * INTEGER                            REFS       102
  2666  IND        INTEGER    ARRAY     TOMB          REFS         8       28   DEFINED       157
  1656  IO         INTEGER                            REFS       163      164   DEFINED       146
  1613  IRD        INTEGER                            REFS       105  DEFINED        43
  1667  IRDU       INTEGER                            REFS       176      211
  1645  ITAPE      INTEGER                            REFS       117  DEFINED       112       113
     2  ITAPEP     INTEGER              COMRWP        REFS        34
     0  ITAPER     INTEGER              COMRWP        REFS        34 I/O REFS        75        76        79        83        87
                                                        97
     0  ITAPES     INTEGER    ARRAY     CTAPES        REFS        20       33        46        47        48        49        50
                                                        51        52       53        54
     7  ITAPET     INTEGER              CTABLE        REFS        36
     1  ITAPEW     INTEGER              COMRWP        REFS        34 I/O REFS        88        91       191       193       199
                                                       200       203      235       240       241       244       246
  1710  I2         INTEGER                            REFS       246  DEFINED       245
  1673  J          INTEGER                            REFS       201      202     2*203   DEFINED       195
  1614  JCD        INTEGER                            REFS       105  DEFINED        44
  1670  JCDU       INTEGER                            REFS       176      211
  1711  J1         INTEGER                            REFS       246  DEFINED       246
  1634  K          INTEGER                            REFS        79       87       208       209       215     2*224     3*226
```

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VARIABLES        SN  TYPE             RELOCATION
                                                   230    DEFINED        79        87       206       212       229
    1660  KDRAW      INTEGER                       REFS       249   DEFINED       151
    1642  KEND       INTEGER                       REFS       102       117       121       122       124
                                                DEFINED       155
    1676  KJ         INTEGER                       REFS       208       209       223     2*224   DEFINED       207       222
    1636  KK         INTEGER                       REFS       102     2*104       105       110       116       117       121
                                                   122       124       125       127       128       151       153       154
                                                   165       174       177       186       208       215       219       224
                                                   228       235       240       243       250   DEFINED       101       149
    1705  KONS       INTEGER                       REFS       237       239   DEFINED       234
   21133  KPLOT      INTEGER    ARRAY              REFS         9        96       151   DEFINED        81        83
    1607  KQINT      LOGICAL                       REFS        39       163       164       255   DEFINED        68        69
    1626  KQRS       INTEGER                       REFS       232   DEFINED        65
    1605  KSURF      LOGICAL                       REFS        39        76       113       114       119       120       121
                                                   122       124   DEFINED        75       106       111
       0  KTABLE     INTEGER          CTABLE       REFS        36   DEFINED        57        60
       5  KTABLO     INTEGER          CTABLE       REFS        36
    1701  K1         INTEGER                       REFS       219     2*224     3*226       230   DEFINED       217       230
    1706  K2         INTEGER                       REFS       241   DEFINED       236
    1707  K3         INTEGER                       REFS       241   DEFINED       241
       0  LC         INTEGER    ARRAY     COMA     REFS        13        25        65        66        69        71        72
                                                    82       138       139     2*140       141       162     2*167       171
                                                   179       180     2*183     3*186       220       221       256
    1612  LINC       LOGICAL                       REFS        39       183   DEFINED        75
    1672  LINE       INTEGER                       REFS       196       197       237       238   DEFINED       192       196
                                                   198       233       237       239
    1653  LL         INTEGER                       REFS       170       174   DEFINED       135
    1275  LS         INTEGER    ARRAY     TOMB     REFS         6        28
       0  LTSHF      INTEGER          CTSHF        REFS        35
       0  LZ         INTEGER    ARRAY     KIMA     REFS        16        32   DEFINED        94        97
    1677  MAX        INTEGER                       REFS       214   DEFINED       213
    1621  MTAP10   * INTEGER                    DEFINED        50
    1622  MTAP11     INTEGER                    DEFINED        51  I/O REFS       136
    1623  MTAP12     INTEGER                       REFS       194       218   DEFINED        52  I/O REFS       178       189
                                                   216       248
    1624  MTAP14     INTEGER                       REFS       122   DEFINED        53  I/O REFS       120       184
    1615  MTAP2      INTEGER                    DEFINED        46  I/O REFS        78
    1616  MTAP3      INTEGER                    DEFINED        47  I/O REFS       100       148       155       157       160
                                                   161
    1625  MTAP50     INTEGER                       REFS       256   DEFINED        54  I/O REFS        70       230
    1617  MTAP8      INTEGER                       REFS       113   DEFINED        48  I/O REFS       114
    1620  MTAP9      INTEGER                       REFS       105       112       176       211       214
                                                DEFINED        49
   21152  NAME       INTEGER    ARRAY              REFS        17       176       211
   21154  NAMSRF     INTEGER    ARRAY              REFS        17       105   DEFINED        41
    1610  NBEL       LOGICAL                       REFS        39        86   DEFINED        75
     620  NCLER      INTEGER    ARRAY     IDIOT    REFS        10        29
       3  NCOLS      INTEGER          CTABLE       REFS        36   DEFINED        56
       4  NCOLST     INTEGER          CTABLE       REFS        36
    1644  NCS        INTEGER                       REFS       111       121       124   DEFINED       110
   21145  NCSS       INTEGER    ARRAY              REFS        10       110   DEFINED        74        76
     625  NCTER      INTEGER    ARRAY     IDIOT    REFS        10        29
    1274  NDB        INTEGER          TOMB         REFS        28       128       158       159       186
                                                DEFINED       154       155
    3225  NDI        INTEGER    ARRAY              REFS         7       154   DEFINED       128
    1657  NF         INTEGER                       REFS       152       176       211   DEFINED       147       152
    1655  NKF        INTEGER                       REFS       150       183   DEFINED       145       150
```

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VARIABLES      SN  TYPE            RELOCATION
  1652  NL          INTEGER                          REFS      2*170       174   DEFINED       134
  1666  NOB         INTEGER                          REFS        172   DEFINED       170
  1627  NOPE        INTEGER                          REFS        188   DEFINED        66
     6  NPAGEA      INTEGER               CTABLE     REFS         36
     1  NPASS       INTEGER               CTABLE     REFS         36
  1633  NPIF        INTEGER                          REFS        174   DEFINED        75
  1646  NPOINT      INTEGER                          REFS        117       122   DEFINED       116
  1611  NPTF      * LOGICAL    *UNDEF                REFS         39
  1631  NQ          INTEGER                          REFS        117       121       122       124       125       180       183
                                                       186       190       206       207       212       217       229       230
                                                     3*234       236       241       245       246       250       256
                                                   DEFINED        72
  1654  NRF         INTEGER                          REFS        146   DEFINED       138       141       143
     2  NROWS       INTEGER               CTABLE     REFS         36   DEFINED        55
    57  NRVBO       INTEGER               FLUTAN     REFS         26       141       256
   632  NS          INTEGER               IDIOT      REFS         29        73        76        79        80        83        84
                                                        87        89        93       101       131       149       228       242
                                                       243   DEFINED        71
 21126  NSAA        INTEGER    ARRAY                 REFS          9       177   DEFINED        79
  1307  NWB         INTEGER               TOMB       REFS         28       127       156       194       195       213       218
                                                       222   DEFINED       153       155
  3220  NWI         INTEGER    ARRAY                 REFS          7       153   DEFINED       127
  1671  OSAAA       REAL                             REFS        180       183   DEFINED       177
  1663  P           REAL                             REFS        174       180       183   DEFINED       166       167
  1712  PP          COMPLEX    ARRAY                 REFS          5        22       194       203       218       224
  4526  Q           COMPLEX    ARRAY                 REFS          8        22       226       230       246
                                                   DEFINED       208       226
     0  QMWT        REAL       ARRAY      FLUTQ      REFS         14        24       215       219
 12726  QS          COMPLEX    ARRAY                 REFS          8        22       224       226       241
                                                   DEFINED       209       224
   310  QWT         REAL       ARRAY      FLUTQ      REFS         14        24       224
  1647  QZ          REAL                             REFS        117       122
    40  RVBO        REAL       ARRAY      FLUTAN     REFS         15        26       163       256
     0  R1          COMPLEX    ARRAY      CORPSE     REFS          5        22        27   DEFINED       173
     1  TSHF        REAL       ARRAY      CTSHF      REFS         19        35
  1662  VBO         REAL                             REFS        167       174       183       186       191       199     2*221
                                                       235       240       244       250   DEFINED       162       163       164
     2  VVBO        REAL       ARRAY      FLUTAN     REFS         15        26       164       256
  1606  WILK        LOGICAL                          REFS         39       117       122   DEFINED       107       119
  1702  XD          REAL       ARRAY      TOMB       REFS          3        28   DEFINED       160
  3206  XI          REAL       ARRAY                 REFS          6       102       104       132
  1650  XM          REAL                             REFS        132       134   DEFINED       129       132
  1302  XMAX        REAL       ARRAY      TOMB       REFS          5        28
  1664  XR          REAL                             REFS        173   DEFINED       168
     0  XW          REAL       ARRAY      TOMB       REFS          3        28       201   DEFINED       157
  1674  XWIN        REAL                             REFS        203   DEFINED       201
  1665  X1          REAL                             REFS        173   DEFINED       169
  2274  YD          REAL       ARRAY      TOMB       REFS          4        28   DEFINED       160
  3213  YI          REAL       ARRAY                 REFS          6       102       133
  1651  YM          REAL                             REFS        133       135   DEFINED       130       133
   536  YW          REAL       ARRAY      TOMB       REFS          3        28       202   DEFINED       157
  1675  YWIN        REAL                             REFS        203   DEFINED       202
  1700  ZQ1         REAL                             REFS        224   DEFINED       215
  1702  ZQ2         REAL                             REFS        224   DEFINED       219
        VARIABLES USED AS FILE NAMES, SEE ABOVE
```

```
EXTERNALS             TYPE   ARGS        REFERENCES
       CNRW                    3            194      218
       COFFIN                  8            174
       DSPDDW                  4            186
       DSPMD                   2            125
       EVOVLE                 10            102
       GEDLAB                  6            176      211
       GETROW                  4            214
       HELZ                    7            121      124
       IMAGE                   6            250
       MODAZ                  10            117      122
       PLAN                    3            104
       PTABLE                  3             58       61
       PUDLAB                  6            105
       QINTP                   7            256
       RIP                     5            180
       TIMEB                   2             77      103      118      126      175      181      251
       TRIP                    9            183

INLINE FUNCTIONS      TYPE   ARGS         DEF LINE  REFERENCES
       AMAX1    REAL           0  INTRIN              132      133
       CMPLX    COMPLEX        2  INTRIN              173
       REAL     REAL           1  INTRIN              223

STATEMENT LABELS                DEF LINE   REFERENCES
    0  2          INACTIVE      127
    0  10         INACTIVE      129
  432  14                       183         179
    0  15                       133         131
  766  19                       257         255
    0  30         INACTIVE      134
    0  32                       173         172
  416  36                       176         171
    0  40                        74          73
  300  42                       144         139      142
  277  43                       143         140
    0  45                       204         190      195
  747  51                       247         232      242      243
  151  57                        98          93       96
 1446  59      FMT              262          87
  436  60                       186         182
  137  67                        93          86
 1450  76      FMT              263          88
  134  77                        92          89       90
 1463  78      FMT              265          91
  472  79                       201         197
    0  80                       209         206      207
    0  81                        81          80
  110  83                        84          82
    0  84                        85          84
  701  88                       241         236      238
  512  99                       205         188
    0  100                      227         212
    0  110                      226         217
    0  111                      230         229
    0  120                      224         222
 1466  130     FMT              266         244
```

```
STATEMENT LABELS                DEF LINE   REFERENCES
     0  149                       253        149
     0  150                       254        146
     0  225                       246        245
     0  300                       128        101
     0  350         INACTIVE      250        249
     0  401                       157        156
     0  402                       160        159
   350  420                       161        158
   756  450                       252        2*249
  1502  700     FMT               268         75
  1504  710     FMT               269        241        246
     0  888         INACTIVE      156
  1524  900     FMT               272        191        199
  1542  960     FMT               275        193        200
  1544  1005    FMT               276         76         79
  1546  1015    FMT               277         83         97
  1550  2002    FMT               278        203
  1555  2015    FMT               279        235        240
   661  5000                      231        228

LOOPS   LABEL    INDEX      FROM-TO     LENGTH    PROPERTIES
    50  40       I           73  74        2B      INSTACK
    77  81       IL          80  81        2B      INSTACK
   113  84       IL          84  85        2B      INSTACK
   127  77       I           89  92       10B                EXT REFS
   140  57       I           93  98       14B                EXT REFS
   156  300      KK         101 128       63B                EXT REFS
   246  15       I          131 133        6B      INSTACK
   302  150      IO         146 254      461B                EXT REFS  NOT INNER
   306  149      KK         149 253      453B                EXT REFS  NOT INNER
   320  401      IJ         156 157       14B                EXT REFS
   336  402      IJ         159 160       12B                EXT REFS
   406  32       I          172 173        4B      INSTACK
   451  45       I          190 204       41B                EXT REFS  NOT INNER
   462  45       J          195 204       26B                EXT REFS
   513  80       K          206 209       21B                NOT INNER
   524  80       KJ         207 209        4B      INSTACK
   536  100      K          212 227      100B                EXT REFS  NOT INNER
   550  110      K1         217 226       64B                EXT REFS  NOT INNER
   606  120      KJ         222 224       14B        OPT
   641  111      K          229 230       20B                EXT REFS  NOT INNER
   644           K1         230 230       11B                EXT REFS
   673  88       K2         236 241       26B                EXT REFS  NOT INNER
   704           K3         241 241       11B                EXT REFS
   727  225      I2         245 246       20B                EXT REFS  NOT INNER
   732           J1         246 246       11B                EXT REFS

COMMON BLOCKS   LENGTH     MEMBERS - BIAS NAME(LENGTH)
        FLUTQ      205              0 QMWT    (200)          200 QWT     (5)
        COMA        41              0 LC      (40)            40 BR      (1)
        FLUTAN      48              0 FMACH   (1)              1 BETA    (1)              2 VVBO    (30)
                                   32 RVBO    (15)            47 NRVBO   (1)
        CORPSE    4000              0 R1      (4000)
        TOMB      2162              0 XW      (350)          350 YW      (350)          700 NDB     (1)
                                  701 LS      (5)            706 XMAX    (5)            711 NWB     (1)
                                  712 AD      (250)          962 XD      (250)         1212 YD      (250)
                                 1462 IND     (350)         1812 AW      (350)
```

```
COMMON BLOCKS   LENGTH    MEMBERS - BIAS NAME(LENGTH)
       IDIOT       411              0 CLEXR  (100)        100 CLEYR  (100)        200 CTEXR  (100)
                                  300 CTEYR  (100)        400 NCLER  (5)          405 NCTER  (5)
                                  410 NS     (1)
       BOXS          2              0 BEL    (1)            1 BSR    (1)
       BXLL          5              0 BEX    (5)
       KIMA         10              0 LZ     (5)            5 IINC   (5)
       CTAPES       50              0 ITAPES (50)
       COMRWP        3              0 ITAPER (1)            1 ITAPEW (1)            2 ITAPEP (1)
       CTSHF         2              0 LTSHF  (1)            1 TSHF   (1)
       CTABLE        8              0 KTABLE (1)            1 NPASS  (1)            2 NROWS  (1)
                                    3 NCOLS  (1)            4 NCOLST (1)            5 KTABLO (1)
                                    6 NPAGEA (1)            7 ITAPET (1)

STATISTICS
  PROGRAM LENGTH                213138    8907
  CM LABELED COMMON LENGTH      154438    6947
          520008 CM USED
```

END

FILMED

5-85

DTIC